Rock Products

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542 SOUTH DEARBORN STREET
CHICAGO

NATHAN C. ROCKWOOD, Editor CHAS. H. FULLER, Manager C. F. TREFZ, Associate Editor

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BUCHANAN JAW CRUSHERS

This Type 'C' Buchanan All-Steel Jaw Crusher Has Crushed 3,000,000 Tons of Hard Trap and Has Never Been Rebabbitted

With 3,000,000 tons to its credit it has never needed any repairs beyond one safety toggle. It has been in continued service for the past six seasons.

The entire construction, excepting the fly wheels, is of the very best quality of Open Hearth Steel, heat-treated and annealed. Pitman is parting, spring balanced and water-jacketed. All joints subjected to strain are machined. All BUCHANAN crushers are furnished with our patented adjustable jaw stroke. Jaw plates, toggle bearings and cheek plates of Manganese steel. Twenty-four sizes in Type "C," from 24x36 in. to 66x84 in. Send for Bulletin No. 10.

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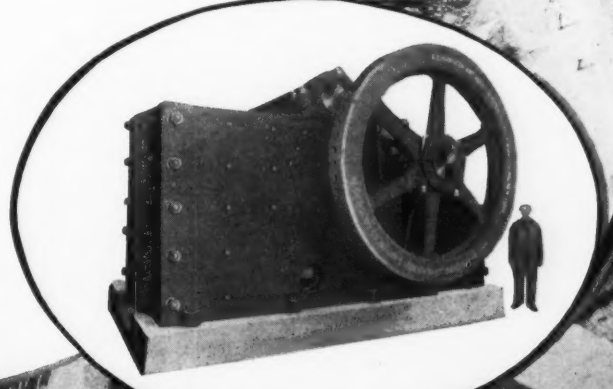

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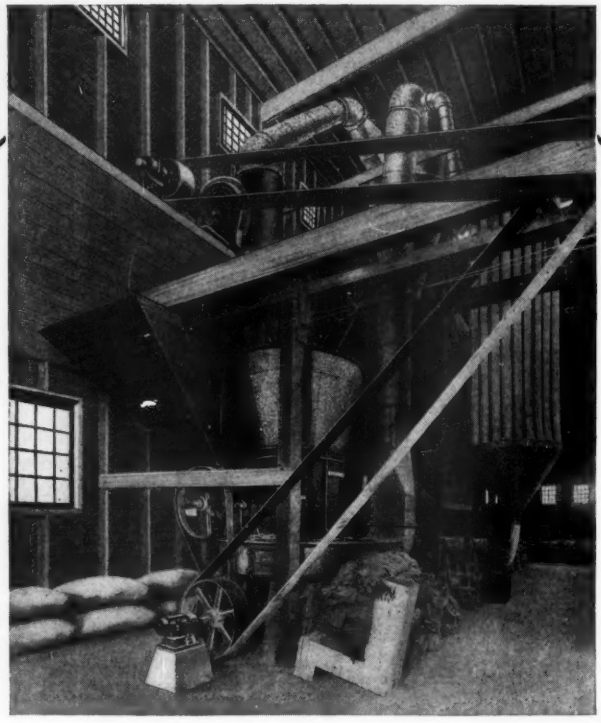

Manufacturing whiting from limestone in a plant at Omaha

The photograph shows one of our 2-Roller Mills which is giving a constant capacity of 2000 pounds per hour, grinding a good grade of limestone to 99.5% and finer passing a 200 mesh, with an expenditure of 40 horsepower.

The grinding of such materials as Barytes, Calcite, Clays, Limestone, Lithopone and similar materials for use by the Paint, Paper and Rubber Trades, are only a few of the many industries where Raymond Mills have more than come up to requirements, and in most instances have far exceeded them.

If you are looking for a clean, dustless operating mill, which in one unit will do all the work without the necessity of using screens, elevators and conveyors, we believe it will pay you to take the matter up with one of our experienced engineers.

EVERY RAYMOND MILL IS COVERED BY AN ABSOLUTE GUARANTEE BASED UPON PAST PERFORMANCES

RAYMOND BROS. IMPACT PULVERIZER CO.
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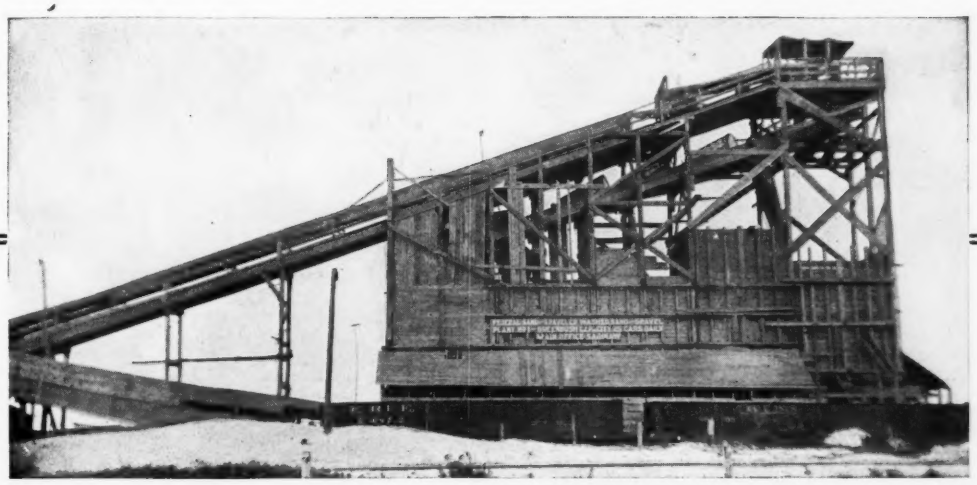

Rebuild Your Old Plant and Get Increased Capacity

WE are now redesigning many small plants—increasing the output and general efficiency, and getting a better product. The illustrations show the Greenbush plant of the Federal Sand & Gravel Co., at Saginaw, Mich. The original plant (lower illustration) was built in 1911.

New additions recently completed—enlarged bin capacity and the installation of improved inclined conical screens—have increased the capacity of the plant approximately 50%. The new plant is shown in the upper illustration.

Let our experienced engineers look over your present plant. No doubt they can suggest a plan that will give YOU greater capacity.

Be prepared to get your share of the big volume of business which is sure to come next spring.

Get in touch with us today.

LINK-BELT COMPANY

480

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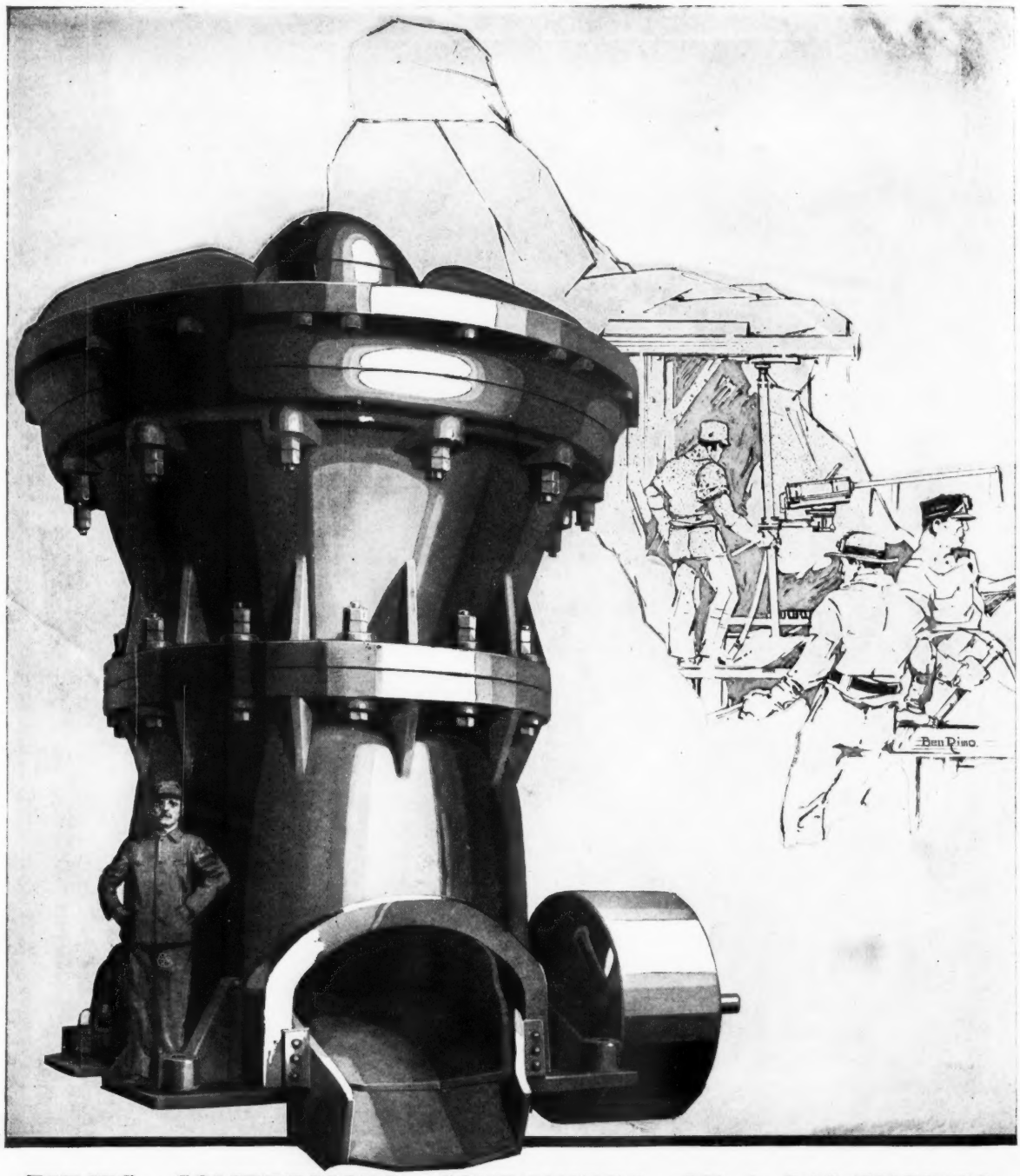

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When writing advertisers please mention ROCK PRODUCTS

Worthington built the first Suspended Shaft Gyratory

1904—Worthington built the first No. 10 Standard Gyratory.

1909—Worthington built the first 10-inch Superior Gyratory.

Worthington pioneered in large Gyratory and Jaw Crusher construction.

Worthington Superior Suspended Shaft Gyratory is the original machine of its type, was designed and built by Worthington years in advance of competing machines and has proved successful in over 250 installations ranging in size from 10-inch to 36-inch openings.

Superior Construction Features

Distance between bearings of main shaft is 35% less than in standard Gyratories—main shaft is 50% stronger. Working parts are perfected against dust and grit by dust proof seal. Lubrication is forced feed by means of submerged gear type pump which delivers oil to eccentric under pressure, gravity return. Gear and pinions, cut steel running in oil.

Send for Bulletin P. M. 50

WORTHINGTON PUMP AND MACHINERY CORPORATION
Executive Offices: 115 Broadway, New York City
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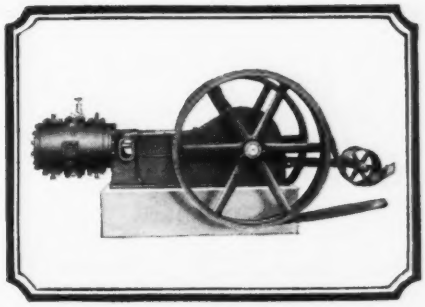
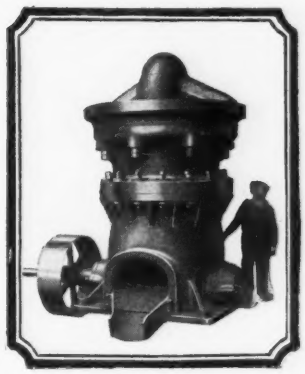


Single Worthington Feather-Valve Compressor arranged for close belt Electric Drive



Worthington Superior Gyratory Crusher

Tell us your requirements, and we will offer a machine to suit your needs. Superior McCully is built in sizes from 10 inch to 60 inch openings: capacities from 30 to 1,500 tons per hour. Engineering service for crushing plants is freely tendered and without obligation to you.

METERS—MINING—ROCK CRUSHING & CEMENT MACHINERY

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Blake & Knowles Works *East Cambridge, Mass.*
Worthington Works *Harrison, N. J.*
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*

Some Users of Telsmith Primary Breakers

Do you wish to find out for yourself the sterling service that is uniformly rendered to all users of Telsmith equipment? Go to the ULTIMATE AUTHORITY—the user. Here are the names of a few people who work with Telsmith and regard him as an old, reliable henchman:

Defrain Sand Co., Philadelphia, Pa.
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Charles Warner Co., Wilmington, Del.
E. J. Lavino & Co., Philadelphia, Pa.
Thomasville Lime & Stone Co., Thomasville, Pa.
Standard Chemical Co., Canonsburg, Pa.
Webster Stone Co., Irvington, Ky.
W. F. Woodruff, Louisville, Ky.
Nashville Ry. & Light Co., Nashville, Tenn.
Quenelda Graphite Corp., Lineville, Ala.
United Railways Co., St. Louis, Mo.
A. R. Young Const. Co., Little Rock, Ark.
Federal Lead Co., Flat River, Mo.
Stringtown Crushed Rock Co., McAlester, Okla.
Penn Iron Mining Co., Vulcan, Mich.
Liberty Bell Gold Mining Co., Telluride, Colo.
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Teck Hughes Gold Mining Co., Cobalt, Ont.
Dept. of Highways, Toronto, Ont.

An inquiry to any one of the above will bring to you volumes more about Telsmith equipment than can be told in the most imposing advertisement. Glad to send you our catalog No. 166 Telsmith Primary Breakers and Bulletin No. 2-F-11 (Telsmith Reduction Crushers).

SMITH ENGINEERING WORKS

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Road Builders Equip. Co. Portland, Ore.
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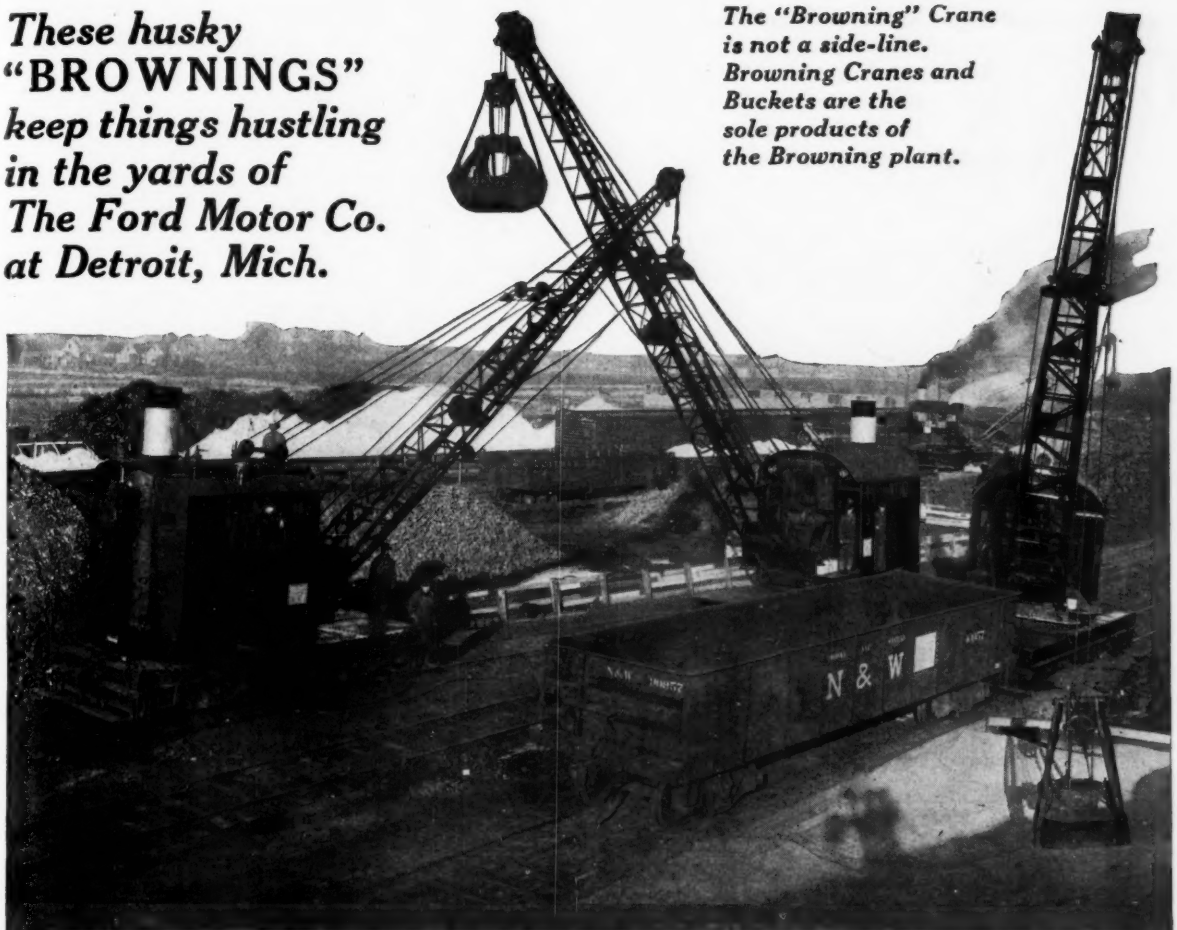
Watson Jack & Co. Montreal, P. Q.
710 Witherspoon Bldg. Philadelphia, Pa.

These husky "BROWNINGS" keep things hustling in the yards of The Ford Motor Co. at Detroit, Mich.

The "Browning" Crane is not a side-line. Browning Cranes and Buckets are the sole products of the Browning plant.



BROWNING Locomotive Cranes have, by sheer merit, won their way into the service of the largest concerns.

Their use in the above yards is proof positive that they will do the work at the lowest possible net cost; that they will stand up under 24 hours a day of continuous service; that they are easily and swiftly operated and that there is practically no expense for upkeep.

When you consider that these same cranes can quickly be set at work excavating, hoisting concrete, placing structural steel or by a few easy changes converted into a steam shovel of wide reach or a pile-driver with 24-foot radius, you will understand why the name-plate "Browning" on a crane means the ultimate in efficiency.

To find out what a "Browning" will do for you, write for catalog, and production figures on your work.

THE BROWNING COMPANY, Cleveland, Ohio

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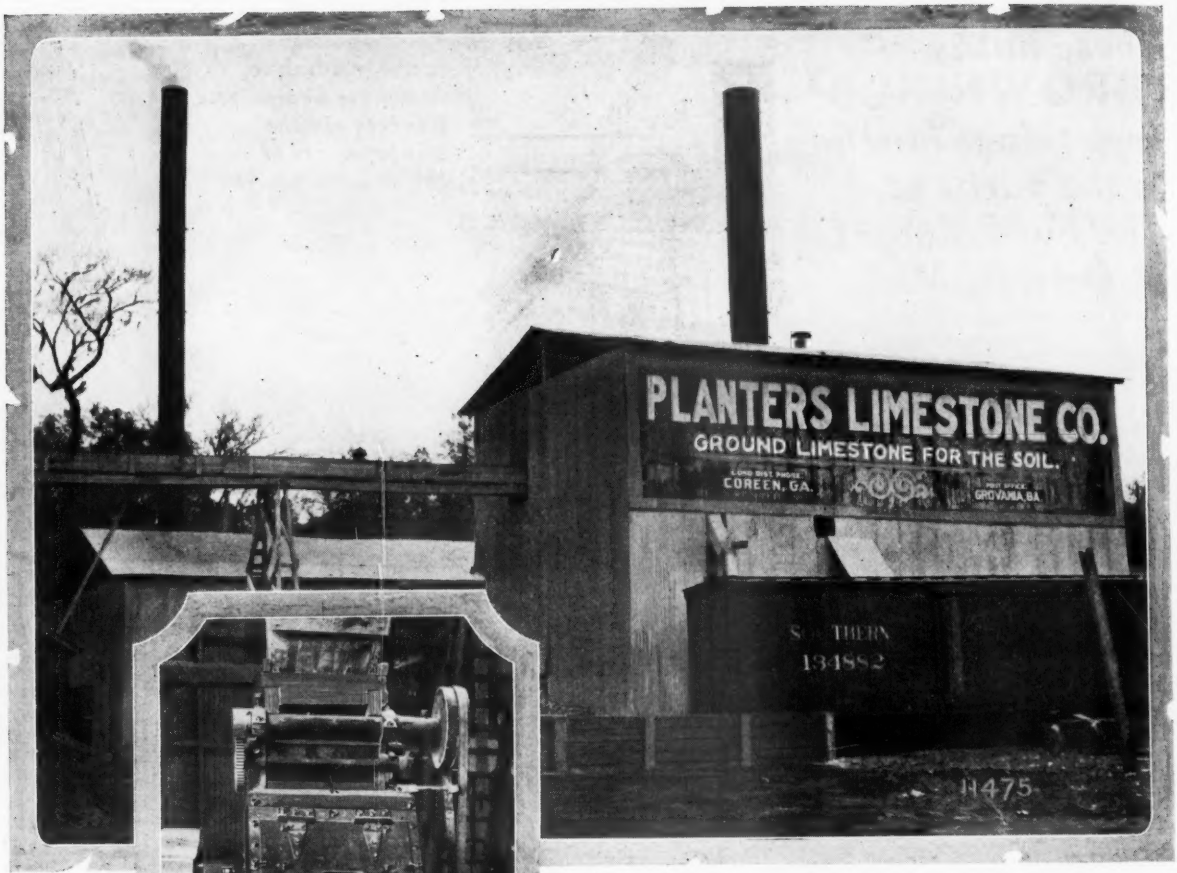
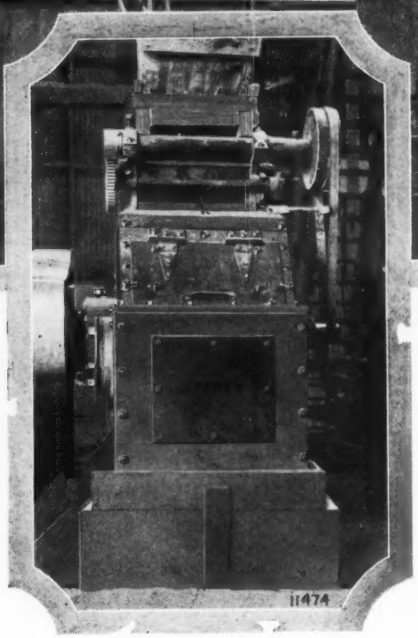
BROWNING

"The All-Around Champion"



The above plant at Grovania, Ga., now owned and operated by W. F. Culbert of Marion, Va., is equipped with Jeffrey Pulverizer and Elevator



Jeffrey Type "D" Ball Bearing Pulverizer producing agricultural limestone

Especially Adapted for Making Agricultural Limestone

Write for Catalogue 147-D giving full information

Plants of the Leading Quarry Operators Are Being Equipped With

Jeffrey Type "D"

Ball Bearing

PULVERIZERS

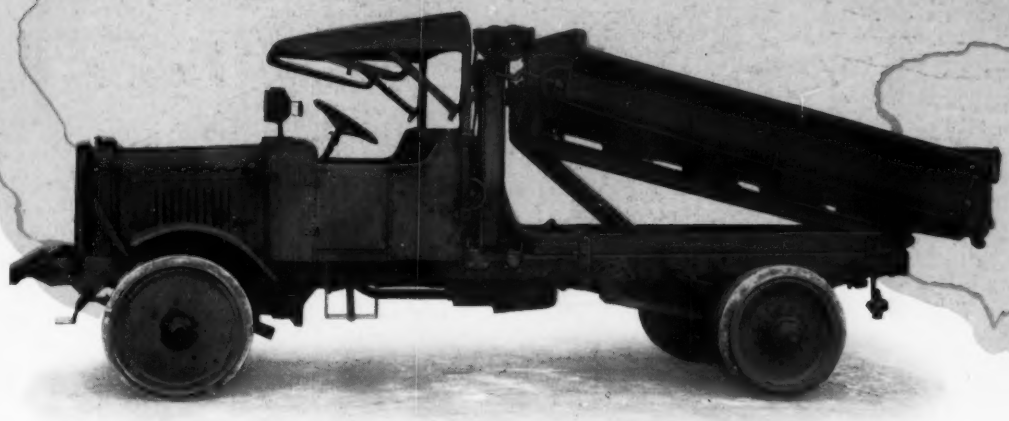
for increasing their capacities to meet the constantly increasing demand for ground limestone.

The Jeffrey Mfg. Co., 935 North Fourth St. Columbus, Ohio

New York Boston · Philadelphia Cleveland · Pittsburgh Chicago · St. Louis Birmingham · Dallas Milwaukee · Seattle Denver · Montreal Detroit

Manufacturers of Pulverizing, Conveying and Elevating Machinery; Chains; Self-Propelling Loaders; Electric Trolley and Storage Battery Locomotives, etc.

Famous War Trucks Now "K & J" Equipped are building— Good Roads in the U·S·A·



"U. S." Truck--Type "Heavy Aviation" Equipped
(In Partial Dumping Position)

With "K & J" Automatic Power Hoist and "K & J" Standardized Steel Dumping Body

Truck Bodies built on the load-handling experience of two generations.

Carrying and dumping loads have been two parts of the same problem for many years.

Replace your worn out truck bodies without a long wait and at less expense.

TRADE MARK

AL OF SATISFACTION K&J

Some Reasons Why Certain States Can Afford to Standardize on "K & J" Dumping Equipment.

"K & J" Standardized Dumping Equipment is a product of big production facilities---of engineering talent long experienced in the design of equipment for moving dirt, gravel, ores, and other granulated materials.

The problem of suitable load beds has always been linked with that of discharging loads either by hand or power. The principles back of "K & J" Hand Hoists and "K & J" Light and Heavy Duty Power Hoists quickly brought the endorsement of the big truck-operating contractor of today. They are just the same sound principles that have brought the contractor's endorsement of "K & J" Road-Making Tools and Equipment for the last thirty-five years.

"K & J" Motor Truck Dumping Bodies are ***Standardized.*** They are of designs agreed upon as best adapted to the work by contractors and automotive engineers in conference. They have all the improvements that could be brought out in such a conference.

The "K & J" Adjustable Underframe permits "K & J" Standardized Bodies to be quickly fitted to any chassis. The wide range of sizes offered provides a body for every use.

With these points worked out big production is possible--so big as to compare well with truck production.

"K & J" Standardized Truck Bodies may be shipped in car-load to body dealers. You get them quickly and at a saving in freight.

Ask your truck dealer about a "K & J" Distributor, or write us.

The Kilbourne & Jacobs Mfg. Company

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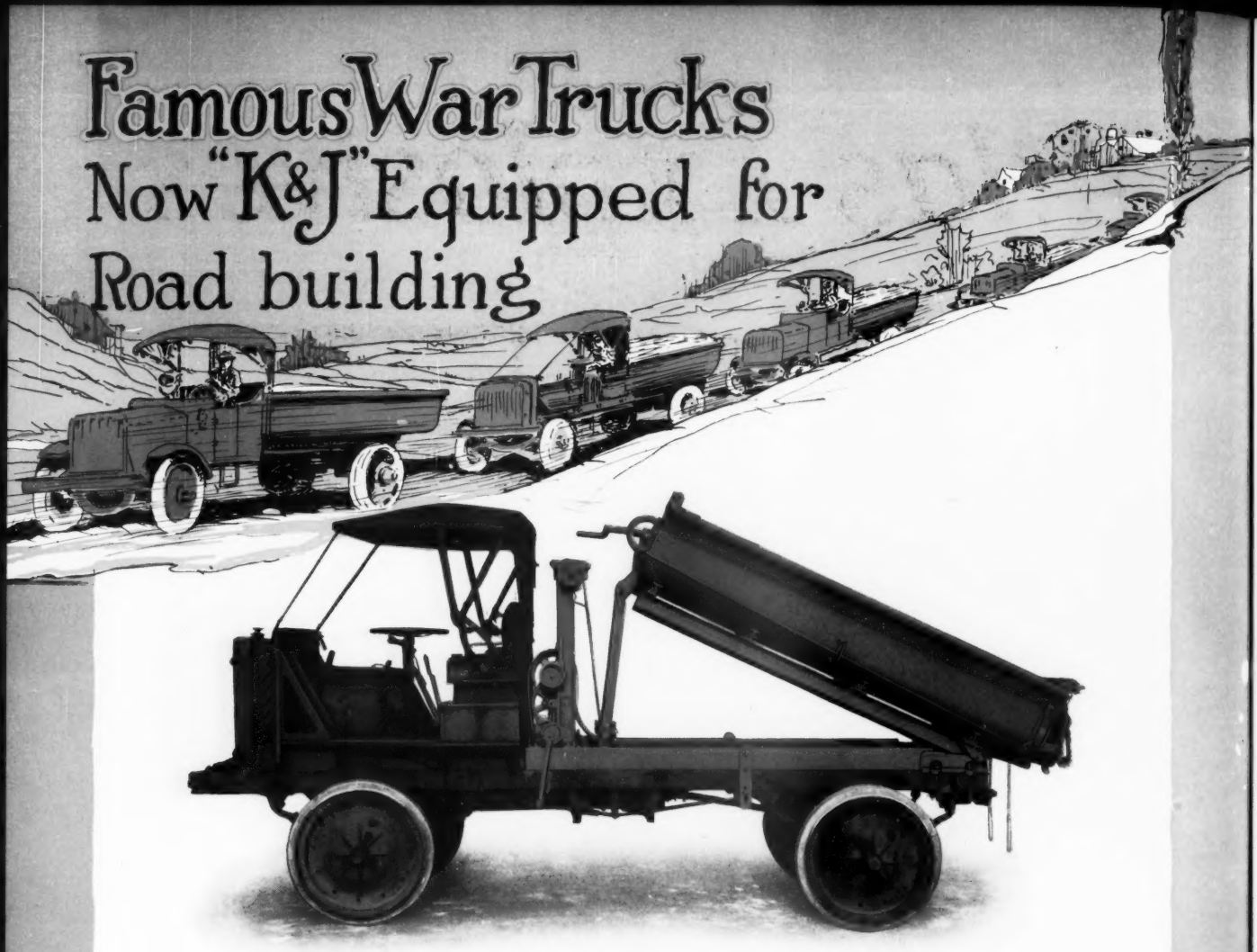
Famous War Trucks Now "K&J" Equipped for Road building



United States Truck--Type "Quad"
(In Partial Dumping Position)

Equipped with

"K & J" Hand Hoist and "K & J" Standardized Steel Dumping Bodies.

The Advantages of "K & J" Dumping Equipment are Important--Study Them.

1. Power Hoist is driven from "sliding jaw" clutch on propeller shaft through a chain. Rugged, simple, positive, controlled by lever easily reached from driver's seat.
2. Malleable bracket on hoist base provides means of quickly riveting hoist to chassis frame.
3. Hoisting arms shipped attached through rugged brackets riveted to lower front corners of body and to front I-Beam cross-member. Arms fold flat under body. In dumping they travel rails leading up hoist columns. No stiff arms projecting below top of chassis frame to cause trouble in dumping on uneven ground.
4. Power hoisting mechanism automatically disengages at total lift and total descent. Can disengage manually at any desired angle up to 45° worm lock holding body without brakes or clutches. Can be re-engaged for travel either up or down. Driver may start with body at full dump. Hoist will lower body and disengage with truck in motion. Entire mechanism housed in bath of oil. No pumps, cylinders or pistons. Hence small upkeep cost.
5. Overall hoist height always low--no rising members. Cable winds on grooved drums applying lift at lower front body corners, first directly then through hoisting arms practically eliminating back pull on hoist.
6. Partial dumping tail-gate control, manually operated from drivers seat allows "spreading" load with truck moving. Quadrant at handle is ratcheted. Control lever engages any notch to regulate tail-gate opening.
7. Body splendidly fabricated. Lower inside corners rounded --no clogging and consequent rust. All inside rivets countersunk. Sides flared for extra strength and front crowned avoiding spill upon hoist or chassis. High hinged tail-gate for ample dumping clearance.
8. Rigid and adjustable underframe permits quick fitting to any width chassis frame without shop process.
9. Deep oak "cushion" sill strengthens frame and provides buffer against body--also takes away certain vibration strains from motor, transmission and axle.
10. Stout hinges provide rigid attachment of dumping unit to truck frame at rear and tend to prevent side-sway in dumping.

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The Kilbourne and Jacobs Mfg. Company

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Columbus, Ohio, U.S.A.

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Atlas Explosives

Above: *Face in quarry of Dixie Portland Cement Company, Richard City, Tenn., before the blast.* **Below:** *The effect of the blast, in which 52,000 pounds of Atlas Explosives were used, loaded in well holes. Atlas Service Men have assisted at many of the largest well-drill blasts ever fired.*

have reduced *blasting* costs and—by breaking the rock right—have reduced *handling* costs in every class of quarry work.

One reason why Atlas Powders are preferred by so many of the largest quarrymen, miners and contractors is that the explosives engineers of the Atlas Service Division take a personal and permanent interest in the way Atlas Powders are used. They co-operate with quarrymen to secure the proper balance between cost of explosives and cost of drilling and between blasting efficiency and rock loading efficiency. Frequently they are able to suggest changes in methods or in explosives that save their clients thousands of dollars.

Our Service Men will gladly co-operate with you. They will go anywhere to help in reducing blasting costs without obligation to you. Put your blasting problems up to us.

ATLAS POWDER CO.,
140 North Broad Street, Philadelphia.

Branch Offices: Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Des Moines, Ia.; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Memphis; Nashville; New Orleans; New York; Philadelphia; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.

ATLAS EXPLOSIVES

break the rock right

Champion—in Name and in Deed

About six thousand Champion Rock Crushers are in active service today. They are used everywhere, for the efficient Champion yields the utmost in satisfaction.

One reason for this wide-spread recognition is the complete *trustworthiness* of the Champion. Actual service under rigid conditions has proven surely that this rock crusher does *last longer.* Every material that goes into it has been proven the right one for the service to be given. Its construction is thoroughly practical and simple.

The design is the perfected result of twenty-eight years invested in its development. In fact, this test of years has confirmed the supremacy of the first Champion. Its construction principle is basicly the same today, with improvements in details and finish.

There is a Champion Rock Crusher for every kind of work. We will be pleased to send you complete specifications and prices. Write us now "lest you forget".

We design, build and install complete Rock Crushing plants.

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Crushing, Elevating, Screening, and Conveying Equipment

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DUPLEX TRUCKS

BUILT FOR BUSINESS

Allied Mining & Milling Co.

Silver Peak, Nevada
April 3, 1919

Dear Sir:

You are at liberty to use something of this sort for we are happy to give an endorsement to the performance of the Duplex we bought last year, if you wish.

Steep grades, sand, and rough road leading to the Allied mine in Palmetto Mountains, 8,000 feet above sea level, held no terrors for the Duplex. We replaced ten-horse freight outfit with the four-wheel drive motor truck, picking on the Duplex because of the heavy grades. The car gave satisfaction. We cut hauling costs on ore 30 per cent and you can count on us as being Duplex boosters all the way.

By Dave Trepp,
General Manager.

Duplex Limited

Medium Capacity—Two Wheel Drive—High Speed $2575 F. O. B. Lansing

DUPLEX
BUILT FOR BUSINESS

DUPLEX 4-Wheel Drive Trucks are typical examples of American progress. They occupy a prominent place in every line of the mining business and their prestige is permanently fixed in the minds of business men.

Yet it is little wonder that increasing numbers of mining companies are learning about Duplex performance and applying it to their own business. Merit soon establishes a standard and the buying public are quick to sense a leader.

Duplex truck success is due to a number of things but mainly to their performance—their dependability. Profitable truck operation can come only from constant service.

Get all the facts about Duplex Trucks. You will find them interesting and perhaps profitable.

Duplex 4-Wheel Drive
3½ Ton Capacity. Price $4250, f. o. b. Lansing

Duplex Truck Company
Lansing · Michigan

One of the Oldest and Most Successful Truck Companies in America

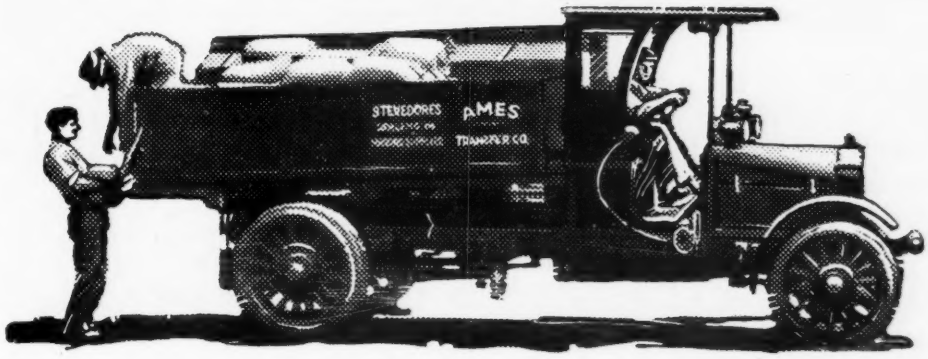
48

of the First Fifty

Pierce-Arrow trucks are still running after 8 years. Their initial cost has been distributed over 8 years. Each added year they run it will spread further.

Buy reliability. Every day a truck is off the job it is costing money and losing earnings. Your truck should last for years and earn profits every mile it runs.

THE PIERCE-ARROW MOTOR CAR COMPANY, Buffalo, N. Y.



No. 25 has served the Ames Transfer Co., New York, for 8 years. Tried out in competition with mule teams formerly used, its record was so good these teams were all displaced by Pierce-Arrows.

They standardize now with 36 Pierce-Arrows, each bought with profits earned by the trucks.

The actual mileage covered by No. 25 is in excess of 150,000 miles. The original worm still serves with no evident diminution of power.

Pierce Arrow

Delivers more work in a given time.

Loses less time on the job and off the job.

Costs less to operate and less to maintain.

Lasts longer, depreciates less and commands a higher resale price at all times.

"ONE MAN – ONE MINUTE"

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CRUSHERS, GRINDERS, ROLLS, SCREENS, COAL CRUSHER AND SAMPLERS

Every part accessible for quick, easy and thorough cleaning. No salting of samples. Accurate, automatic adjustments while running Hundreds in use all over the world.

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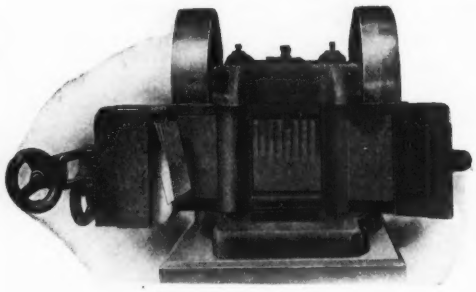
Crushers reduce hard rock and ores to ¼-inch and finer.
Rolls crush hard rock and ores from ⅛-inch to 40 mesh.
Pulverizers grind to from 80 to 100 mesh.
Coal Crusher and Samplers crush coal or coke to ¼-inch and at same time automatically remove a 5, 10 or 15% sample.

ALSO

"OPEN DOOR" STEEL ELEVATORS



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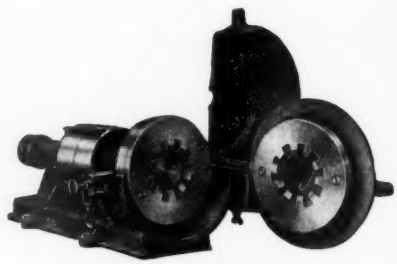

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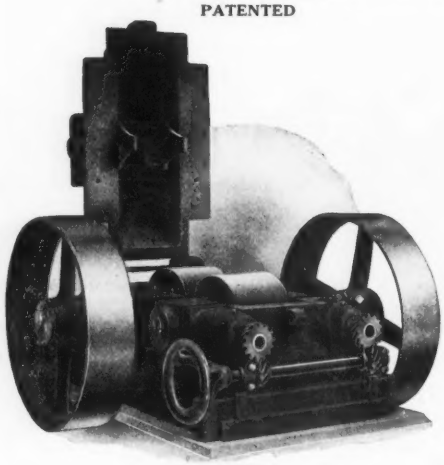

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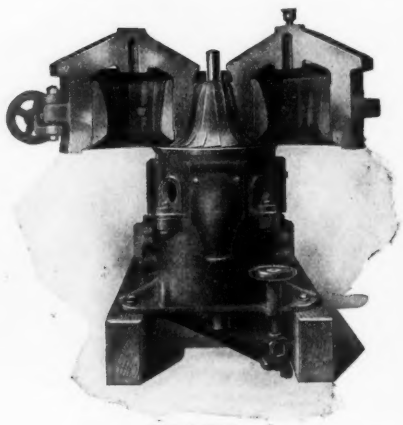

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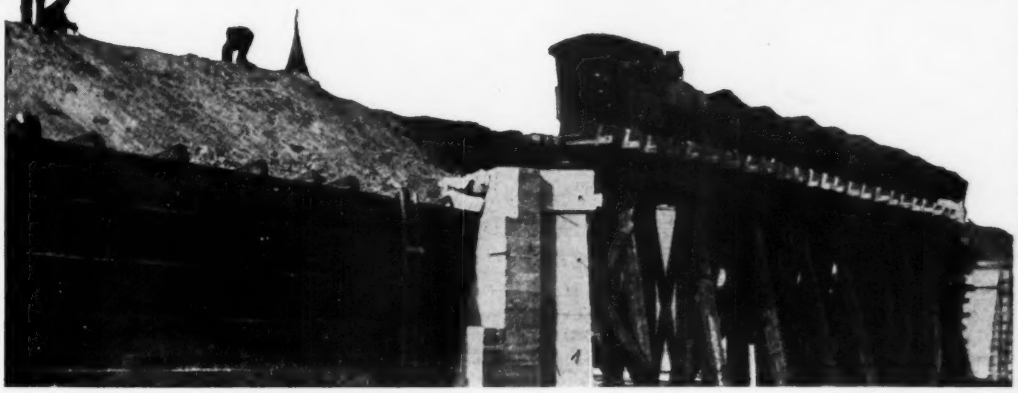
STURTEVANT MILL CO., BOSTON MASS.

HARRISON SQUARE

VULCAN

VULCAN CONTRACTORS' LOCOMOTIVES



Contracting, more than almost any other service, requires sturdiness and day-after-day performance of a locomotive.

It is this continuous, uninterrupted hauling of dirt, concrete aggregates and other loads that gives the contractor an opportunity to make regular profits and to take advantage of bonus opportunities.

VULCAN Locomotives have a unique record of long periods of uninterrupted service—largely because they are specially built for rigorous work.

CORRESPONDENCE SOLICITED

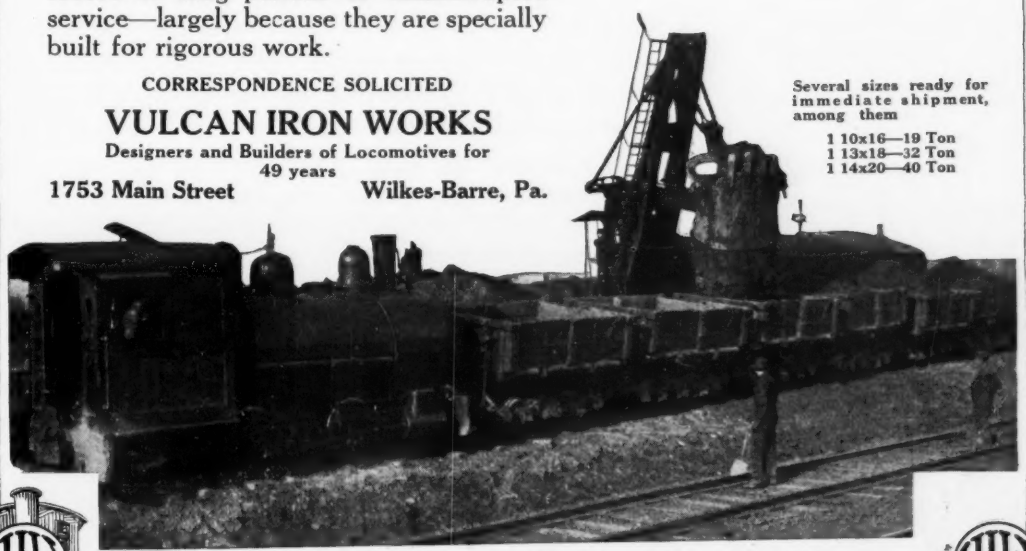
VULCAN IRON WORKS

Designers and Builders of Locomotives for 49 years

1753 Main Street Wilkes-Barre, Pa.

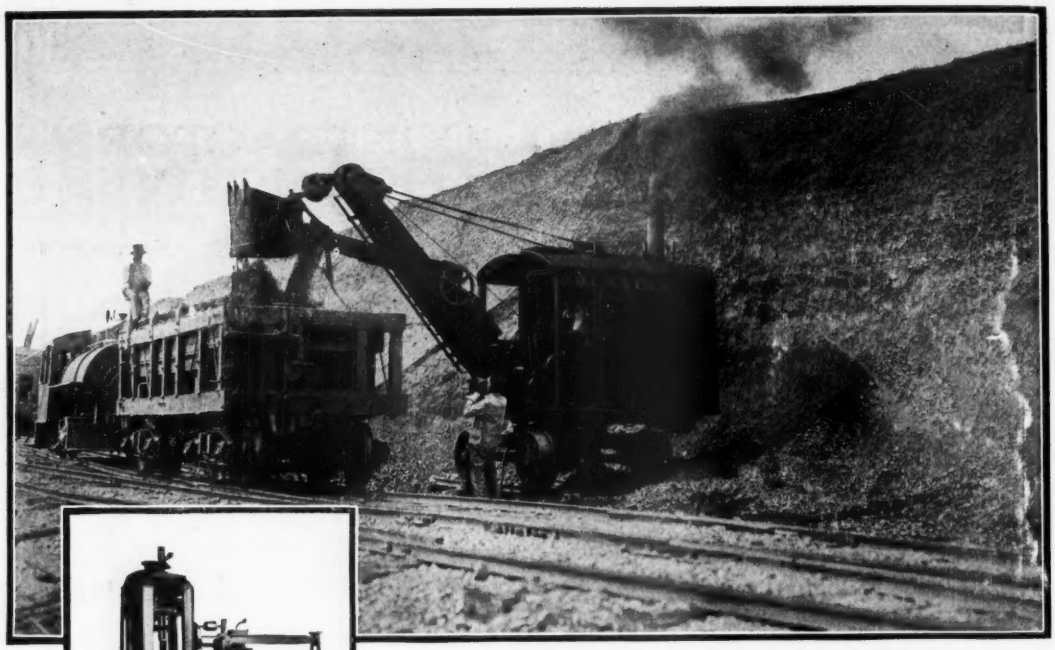
Several sizes ready for immediate shipment, among them

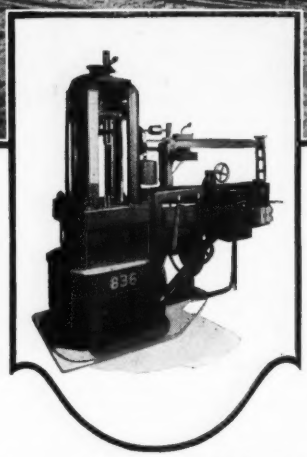
1 10x16—19 Ton
1 13x18—32 Ton
1 14x20—40 Ton



VULCAN Contractors' Locomotives—many sizes and types from 7½-ton 6x10's to 75-ton 20x26's (120-ton with tender).

VULCAN





Testing machine in physical laboratory at the "Marion" plant to determine the strength of various individual parts of "Marion"-built equipment. We have several such machines and keep them busy!

Steady Plugging Sure Does Count!

The H. D. Conkey Sand & Gravel Co. uses a "Marion" Revolving Shovel to dig gravel from a 25-foot bank at Yorkville, Ill., 40 miles from Chicago.

Without any noise, fuss or fireworks, this little outfit plugs steadily away for 9 months out of 12, so regularly that it hardly misses a single scoop the whole day through. The shovel averages 300,000 tons a year and during its first three years suffered *only one breakdown*—even that was not serious nor directly the fault of the shovel itself.

The owners are thoroughly "sold" on their machine—naturally enough. So are hundreds of other "Marion" users in sand, gravel and clay plants, stone quarries, etc. So will *you* be when you get fully "Marion"-wise. Why not ask for particulars today?

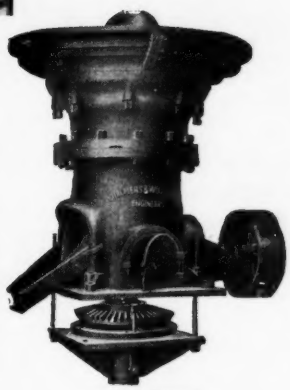
THE MARION STEAM SHOVEL COMPANY

Established 1884 Marion, Ohio

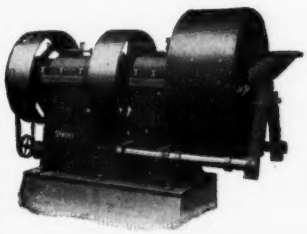
CHICAGO NEW YORK SAN FRANCISCO

Marion

REDUCTION MACHINERY



GYRATORY CRUSHER



SYMONS HORIZONTAL DISC CRUSHER

Build now the National State and County Roads that are needed

U. S. DEPARTMENT OF LABOR

W. B. WILSON, Secretary of Labor

Are you doing your part to supply the necessary aggregate for this work? Our Engineering experience is at your disposal and we solicit the opportunity of quoting on your machinery requirements.

Our Machinery Now In Use In

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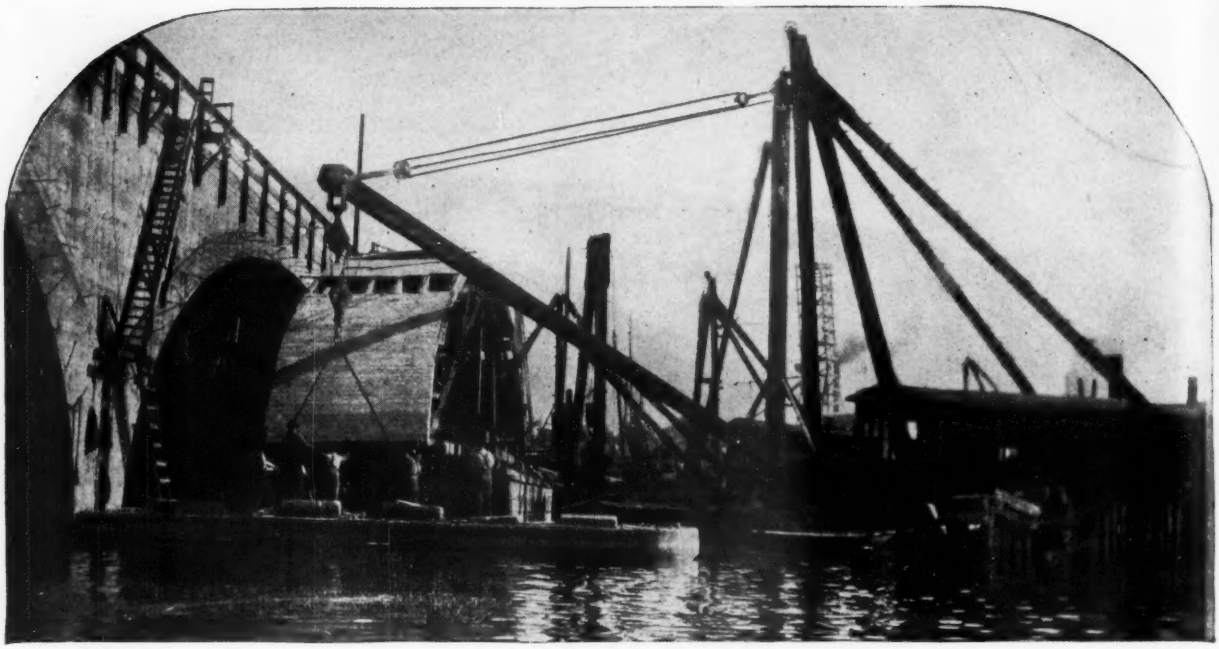

"American" Derricks Build Bridge in Record Time

When the Kuert Construction Company secured the contract for the big concrete and stone bridge at South Bend, Indiana, they faced a difficult problem.

Operating conditions were against them. With time as the main factor they had to handle the enormous quantities of material in the bad weather of fall and winter.

To start with they had to erect a temporary bridge so traffic could continue.

Then their five "AMERICAN" Derricks were put to work on the main structure.

Working against the elements, these machines kept steadily at their task with such efficiency that the job was completed in the record time of five months.

Examples like this prove the superiority of "AMERICAN" Derricks. Wherever speed and low cost of handling are factors, "AMERICAN" Equipment makes good.

No matter where you are, an "AMERICAN" representative can reach you in 24 hours.

"Give me where I may stand and I will move the world"

American Hoist & Derrick Co.
55 South Robert Street
Saint Paul Minnesota
Builders of "AMERICAN"

Hoisting Engines
Electric Hoists
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Logging Equipment

Sugar Cane Machinery
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The Genuine "CROSBY" Wire Rope Clip

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AMERICAN
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LOCOMOTIVES

FOR THE

Rock Products Industry

WE are prepared to furnish industrial locomotives, built to stand the hardest kind of service and the most severe operating conditions for Cement and Lime Plants, Stone Quarries, Sand and Gravel Plants, Gypsum, Phosphate and Sand Glass Plants, and for all industrial purposes.

Baldwin Locomotives—Steam, Gasoline and Electric—are used the world over. They are built throughout to gauges and templets, so that duplicate parts, guaranteed to fit can be furnished promptly.

Consult us as to your requirements

THE BALDWIN LOCOMOTIVE WORKS

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LOCOMOTIVES

Are you getting the rock out at *Lowest Cost?*

IN these days of high operating costs it is important to know exactly how much you are paying for every ton of rock—and whether that figure represents the *lowest possible cost.*

Hundreds of quarries that calculate their costs on a scientific basis (the only way they ought to be figured) are saving money by using

AETNA EXPLOSIVES

You get maximum tonnage with Aetna Explosives because they are manufactured according to the highest standards. No variation in quality or power. The full punch is back of every shot.

Aetna Explosives reach their highest point of efficiency when used according to the formulas worked out by our Engineering Department and in connection with Lion Electric Blasting Machines and Lion Electric Blasting Caps.

AETNA EXPLOSIVES COMPANY
Incorporated
165 Broadway, New York

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It does the work!

AETNA

Rock Products

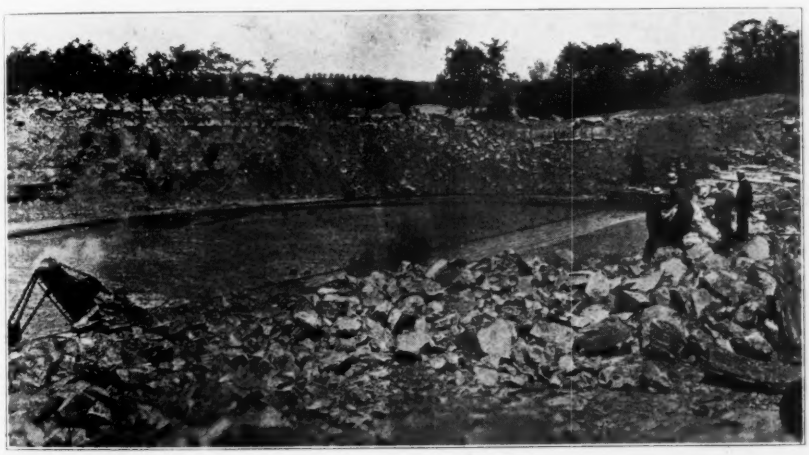
Vol. XXIII | Chicago, February 14, 1920 | No. 4

Model Quarry and Crushing Plant

Rock-Cut Stone Co., of Syracuse, N. Y., Has Attractive Layout and Facilities for Smooth Operation at Auburn Plant

QUARRYMEN WHO HAVE VISITED the Auburn plant of the Rock-Cut Stone Co., of Syracuse, N. Y., consider it one of the model plants of the East. It is perhaps one of the few plants that has been designed for its particular location with a full preliminary knowledge of all the conditions and requirements, gained by operating an older plant at the same location.

The plant was built in 1917 from plans made by Earl C. Harsh, now engineer with the Schaffer Engineering & Equipment Co., Pittsburgh, Penn., at that time in private practice. W. L. Sporborg, president of the company, is an experienced quarry operator, and no expense was spared to make the plant right. Subsequent operation of the plant has demonstrated the efficiency of the layout.



Quarry Operation

The quarry operation is in keeping with the neat appearance of the plant. The entire face of from 40 to 50 ft. is worked in a single bench, using well drills for blast holing and 70-ton steam shovels for loading. The quarry floor is kept scrupulously clean by means of two-horse drag scrapers, as shown in one of the accompanying views.

Stone is brought to the crusher in 4-yd. side dump cars on a 36-in. gauge track by steam locomotives. The cars are the well known side-dump contractor type and the locomotives are of the saddle-tank variety—14-ton. The quarry floor is practically level and trains of six cars are handled with ease.

Crushing Plant

The 20-in. gyratory crusher for initial reduction is located in a concrete-lined

AUBURN, N. Y., QUARRY of the Rock-Cut Stone Co., Syracuse, reputed to be one of the cleanest quarries in the United States. Note the clean quarry floor and in the lower view the two-horse drag scraper for cleaning it—also the alignment of quarry tracks. The quarry is a limestone operation

pit in the quarry floor. The depth of this pit from the floor of the quarry is 22 ft. The details of the crusher pit are interesting and are shown in the accompanying sketch. Also the details of the crusher setting are shown in the adjoining sketch.

Facilities for handling boulders which wedge in the crusher are furnished by the spring-pole device, shown in one of the views. A compressed-air operated cylinder hoist raised and lowered by a 5-h. p. electric motor provides the motive power. The crusher layout as originally designed had a housing provided, but this would have interfered with the use of the hoist. The one criticism of the plant perhaps is that this initial crusher might have been of larger size. It is expected ultimately to install a crusher with a much larger opening to deliver to the present initial breaker.

Long Conveyor Belt

The initial crusher discharges through a hopper distributor to a 30-in. belt conveyor, which is 257 ft. 8½ in. long between centers and rises from the crusher pit at an angle, or slope, of 20 deg. 33 min., a total rise of about 90 ft.

This belt conveyor is carried on a timber trestle having 13-ft. 8-in. bents. It is completely housed and a plank walk is provided on both sides of the belt throughout its entire length.

Screening Plant

The belt discharges to a 60-in. by 16-ft. scalping screen, set at an angle of about 30 deg. to the line of the conveyor belt. This screen rejects everything above commercial or ballast size (4 in.) The scalping screen is also provided with a dust jacket for removing everything below ¾-in., thus increasing the efficiency of the rest of the screen.

All stone passing the scalping screen and rejected by the dust jacket goes to a No. 8 bucket elevator pit and is delivered to the sizing screen. The dust passing through the dust jacket is delivered to a separate bucket elevator which discharges into a new 40-in. by 14-ft. screen, fitted with wire cloth ⅜-in. square opening, on the main body of the screen, and 3/16-in. square opening on the dust jacket. The dust jacket on this new screen is 12 ft. 6 in. long.

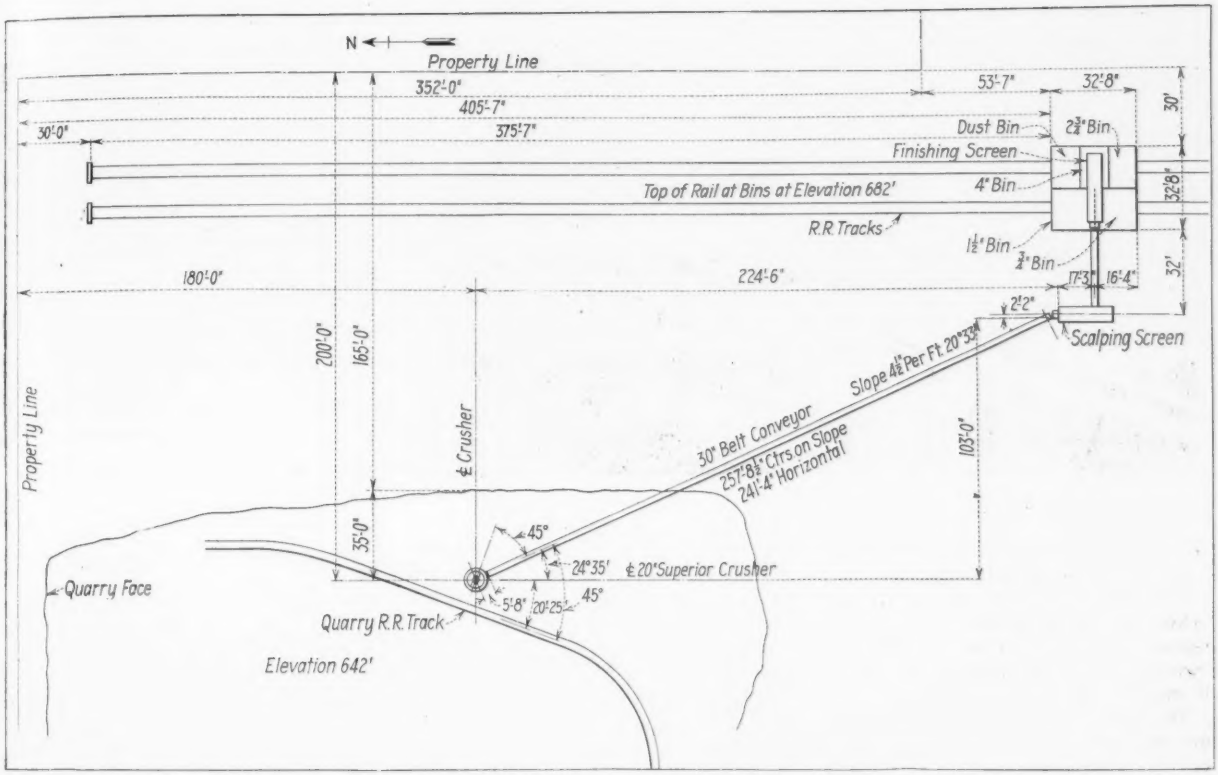
Originally, as shown in the accompanying plans, the dust elevator also served to remove the product of the 36x16-in. crushing rolls and to return their product to the elevator serving the sizing screen. These crushing rolls were designed to recrush the sizing screen rejections, but have recently been taken out as no use was ever made of them.

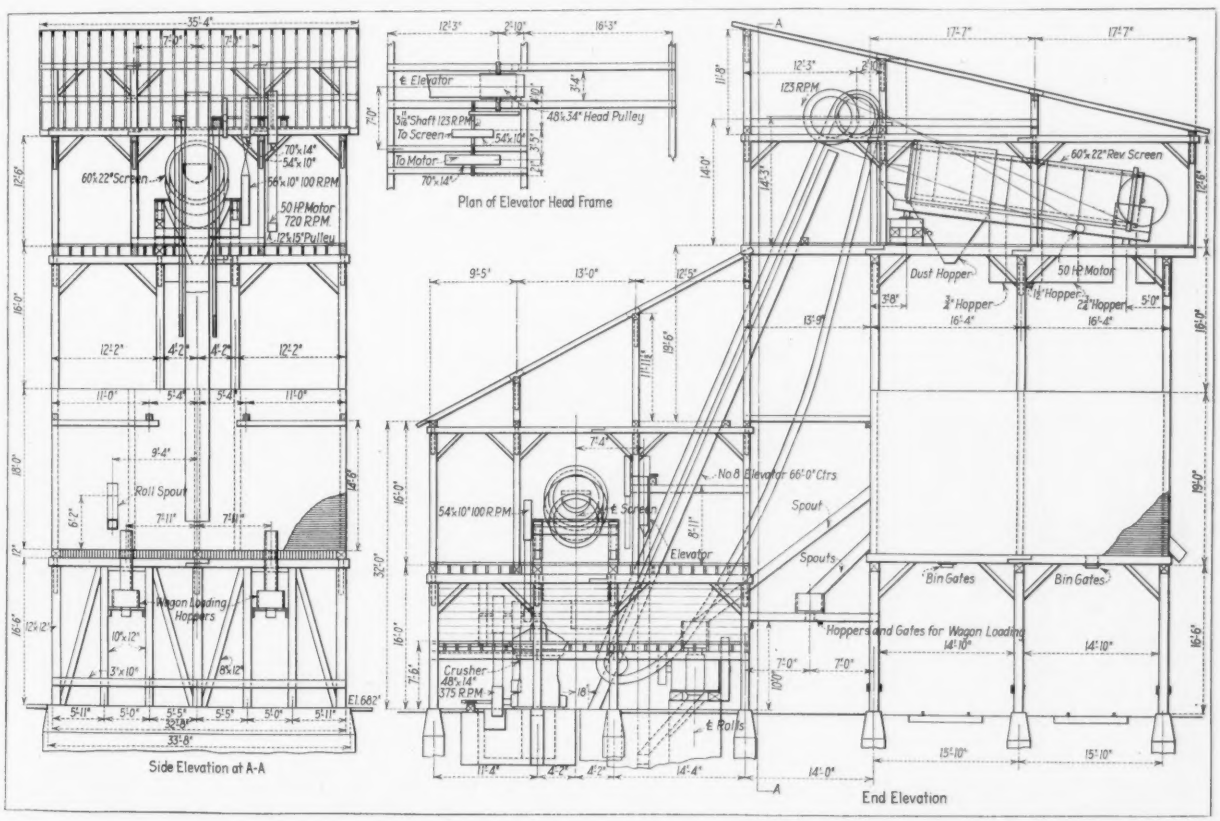
The rejections of the scalping screen go to one No. 6 gyratory crusher whose product is returned to the 30-in. main

Fourteen-ton steam dinky and train of side-dump cars at crusher pit, and foot of conveyor incline

Crusher pit and pneumatic hoist for handling crusher "wedges"

Side-dump contractor type cars dumping into 20-in. crusher, showing conveyor incline at extreme left





Above—General plant of quarry and plant. Below—Elevations of crushing plant

Surface plant of the Rock-Cut Stone Company at Auburn

conveyor belt by a 20-in. belt, as shown in one of the accompanying details.

The elevator from the scalping screen delivers to a 60-in. by 22-ft. dust-jacketed sizing or finishing screen, mounted at right-angles to the scalping screen, 32 ft. distant from it, horizontally.

The new screen, which is not shown on the plans, is mounted parallel to the original sizing screen. When the stone is wet or dirty the ⅜-in. to dust product of the body of this new screen may be wasted. When the stone is dry the product coming off the dust jacket can be run in with the ¾-in. stone, and the product passing through the dust jacket (dust to 3/16-in.) is handled separately.

The sizing screen is mounted, as shown in the sketch, over five bins, one for 4-in. size, one for 2¾-in., 1½-in., ¾-in., and dust. The bins are made with walls of 3x8-in. creosoted yellow pine plank, laid flat and spiked. The floors are laid with 12x12-in. creosoted timbers over the posts with 4x12-in. timbers laid on edge, solid, in between.

Loading Facilities

Two railway tracks are provided under the bins. These car loading tracks have dead ends about 400 ft. beyond the bins, and are so graded that the empty cars are dropped down under the bins.

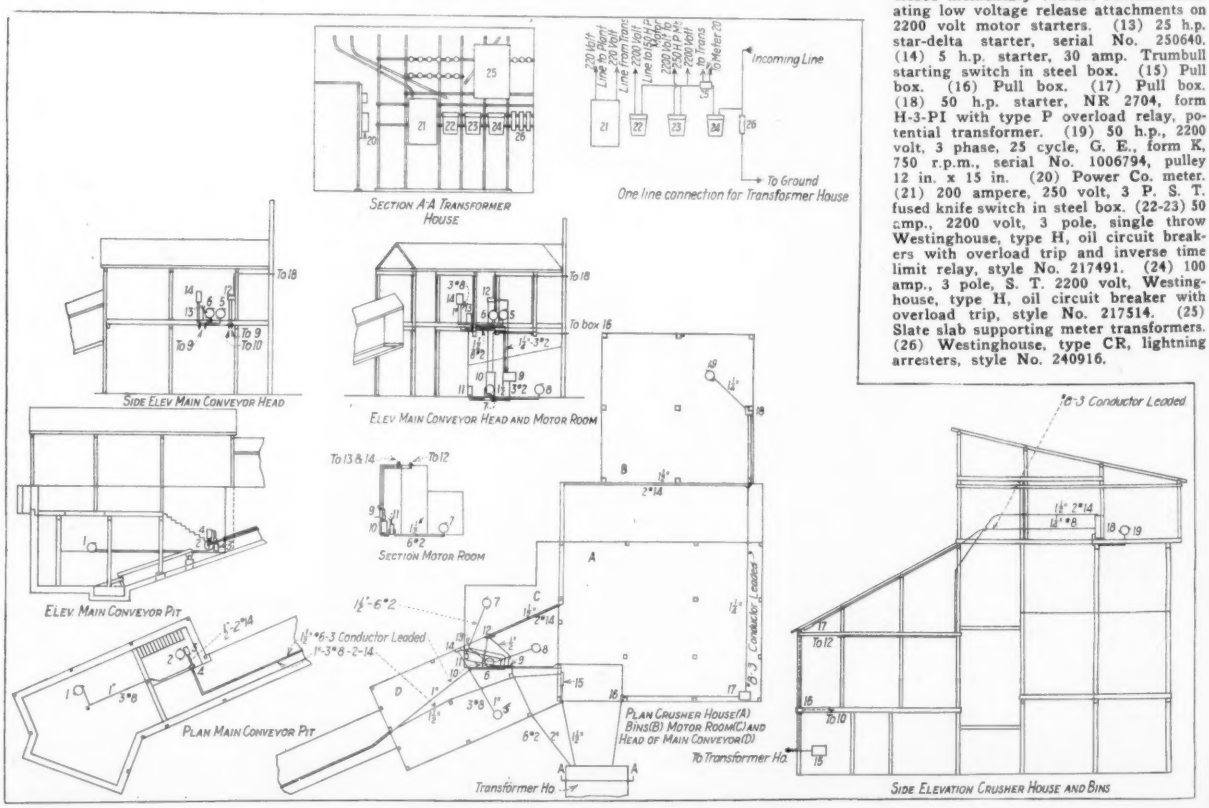
Spouts are provided in the sides of all the bins, as well as in the bottoms. The side spouts are for loading trucks and wagons, without interfering with the car loading operations.

Electric Wiring

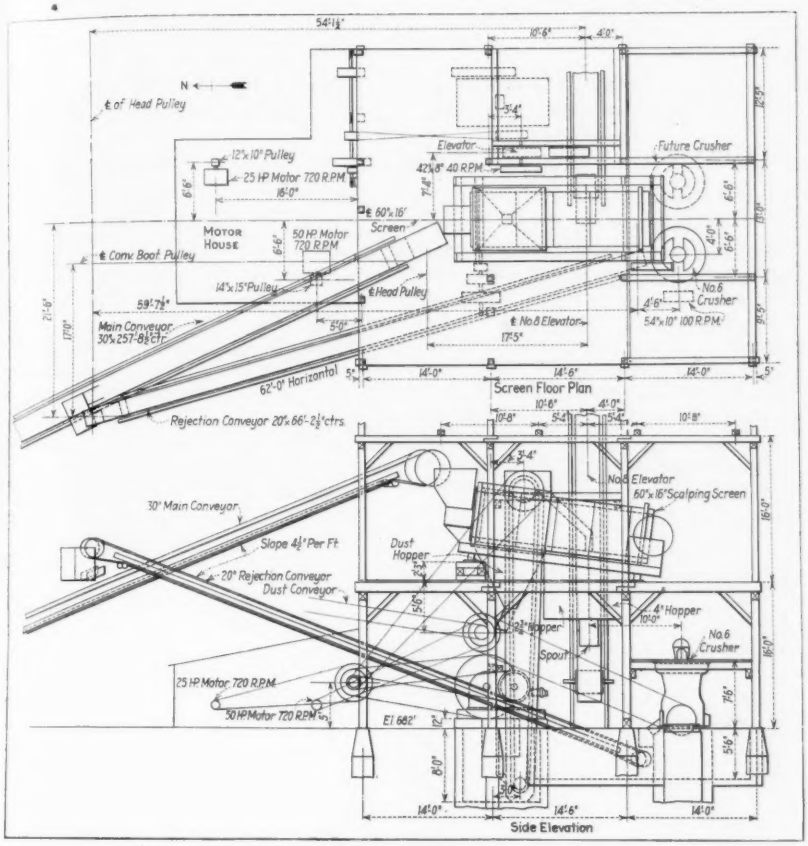
Through the courtesy of W. L. Sporborg, who has supplied the editor with a very full set of plant blueprints, it is possible to reproduce in detail the elec-

MOTOR AND CONTROL EQUIPMENT

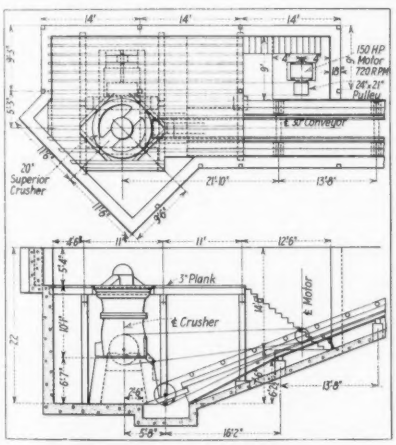
(1) 5 h.p., 220 volt, 3 phase, 25 cycles, G. E., type KT, 750 r.p.m., serial No. 740613, pulley 6 in. x 4½ in. (2) 150 h.p., 2200 volt, 3 phase, 25 cycles, G. E., form K, 750 r.p.m., serial No. 820815, pulley 24 in. x 21 in. (3) 150 h.p. starter type CR 1034, form NR 2708 with type P overload relay, potential transformer. (4) 5 h.p. starter, 30 ampere Trumbull starting switch in steel box. (5) 5 h.p., 220 volt, 3 phase, 25 cycles, C. W. Motor, 750 r.p.m., serial No. 222219, pulley 12 in. x 5 in. (6) 25 h.p., 220 volt, 3 phase, 25 cycles, C. W. motor, 750 r.p.m., serial No. 275943, pulley 12 in. x 11 in. (7) 25 h.p., 220 volt, 3 phase, 25 cycles, C. W. motor, 750 r.p.m., serial No. 64315, pulley 13 in. x 9 in. (8) 50 h. p., 2200 volt, 3 phase, 25 cycles, G. E., form K, 750 r.p.m., serial No. 576650, pulley 14 in. x 15 in. (9) Power Panel, 6 125-amp., single pole cutouts, 2 50-amp. three-pole cutouts. (10) 50 h.p. starter, NR 2704, form A-3, with type P overload relay, potential transformer. (11) 25 h.p. star-delta starter, serial No. 260641. (12) 3 normally closed momentary contact switches actuating low voltage release attachments on 2200 volt motor starters. (13) 25 h.p. star-delta starter, serial No. 250640. (14) 5 h.p. starter, 30 amp. Trumbull starting switch in steel box. (15) Pull box. (16) Pull box. (17) Pull box. (18) 50 h.p. starter, NR 2704, form H-3-PI with type P overload relay, potential transformer. (19) 50 h.p., 2200 volt, 3 phase, 25 cycle, G. E., form K, 750 r.p.m., serial No. 1006794, pulley 12 in. x 15 in. (20) Power Co. meter. (21) 200 ampere, 250 volt, 3 P. S. T. fused knife switch in steel box. (22-23) 50 amp., 2200 volt, 3 pole, single throw Westinghouse, type H, oil circuit breakers with overload trip and inverse time limit relay, style No. 217491. (24) 100 amp., 3 pole, S. T. 2200 volt, Westinghouse, type H, oil circuit breaker with overload trip, style No. 217514. (25) Slate slab supporting meter transformers. (26) Westinghouse, type CR, lightning arresters, style No. 240916.


Section A-A Transformer House
One line connection for Transformer House
Incoming Line
To Ground
Side Elev Main Conveyor Head
Elev Main Conveyor Head and Motor Room
Section Motor Room
Elev Main Conveyor Pit
Plan Main Conveyor Pit
Plan Crusher House(A) Bins(B) Motor Room(C) and Head of Main Conveyor(D)
To Transformer Ho
Side Elevation Crusher House and Bins

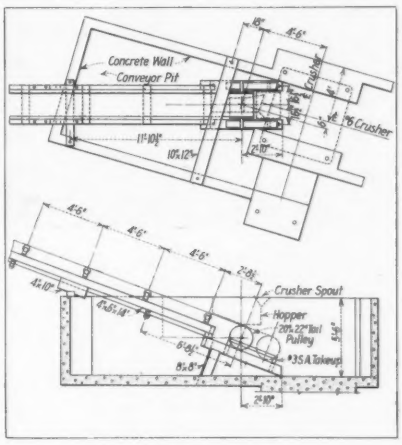
Electric wiring details of crushing plant



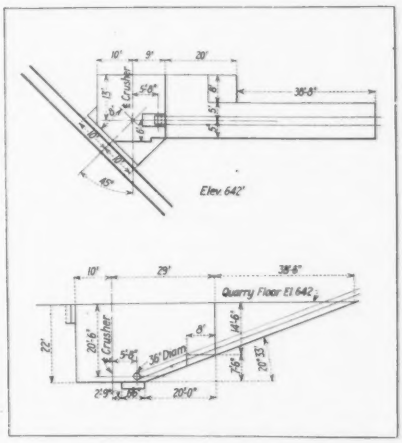
Details of scalping screen and recrusher



Details of crusher layout



Details of crusher pit



Details of conveying layout at pit

tric wiring and control system of this plant, perhaps the first time that such a detail has ever been published.

Current is received at the transformer station at 11,000 volts and is stepped down to 2200 and 220 volts. The connection between the transformers and the various motors and appliances are shown in the accompanying detail. The transformer house is a separate fireproof building shown in the general view of the crushing plant.

Officers

The Rock-Cut Stone Co., of Syracuse operates two crushing plants, the one illustrated and one at Rock-Cut, near Syracuse, N. Y. The president of the company is W. L. Sporborg, the secretary and general superintendent is A. G. Seitz, and the treasurer is J. F. Nash.

The capacity of the Syracuse, or Rock-Cut plant, is about 2,000 tons per day, and of the Auburn plant 1500 tons.

Deposits of Magnesite and Talc in Manchuria

IT IS REPORTED that the magnesite deposits in Manchuria are sufficiently well proven up to show that they are extensive, and have a great potential value. The magnesite is for the most part too pure to use for making bricks without the admixture of 7 to 8 per cent of iron. The Japanese own the larger part of the deposits, but the Chinese still have considerable areas under their control.

Associated with the magnesite are numerous deposits of talc, which may be favorably compared with the high-grade French talc, but which have not yet been extensively developed. All of these deposits are from 3 to 10 miles from the South Manchurian Railway.

January Building Operations

STATISTICS of building contracts awarded during the month of January in the territory east of the Missouri and north of the Ohio rivers, as compiled by the F. W. Dodge Co., show two outstanding facts. In the first place the contracts amounted to ten per cent more than the average monthly figure for 1919; and, in the second place, industrial plants took the lead over all other classes of building, comprising 39% of the total.

Contracts let in January amounted to $235,848,000, whereas the average monthly figure for 1919 was approximately $213,000,000.

These figures give an indication of the accumulated demand for construction work. Ordinarily the month of January shows but little activity in comparison with months later in the year, the amount of building contracts let in that month running normally to only about 5 or 6 per cent of the year's total. With so large a figure for January, the previously published estimate of three billions for the year's total of contracts seems very likely to be fulfilled.

Stone Men's Greatest Convention

R. B. Tyler Plays Kentucky Host According to Tradition—Much Interesting and Valuable Discussion of the Crushed Stone Industry's Problems

HOWEVER GREAT and glorious may be the National Crushed Stone Association's conventions of the future, *the third annual* at Louisville, Ky., February 9, 10 and 11 will live in the memories of all present as one resplendent with good cheer and good fellowship, and last but not least, by the exchange of much valuable experience and information.

In his opening address, President Blair stated that the nation's output of crushed stone in 1919 had been limited by the capacity of the railways to handle it, and that there was every reason to believe that this present year's output would be *limited only* by this same condition. He emphasized the point that the tendency of association members to drop out in times of prosperity because they then felt their ability to paddle their own canoes, was entirely wrong; that there was as much reason for organization then as at any other time.

Transportation and Freight Rates

As was to be expected, the subject of freight rates and car service was the one that was most discussed. Just as at the 1919 convention in Buffalo, N. Y., it was brought out in the discussion that there were all kinds of rates on crushed stone, some low and some very high, relatively, varying not only in different districts, but often there were very great differences in the same territory.

There was no general sentiment for any standard system of rates, either for the country as a whole, or for regional traffic districts, although many of the best-posted traffic men and operators present believed that such an adjustment of rates must ultimately be made.

P. C. Hodges, of the Marble Cliff Quarries Co., Columbus, Ohio, made the most generous contribution to the discussion of freight rates, and he was eventually made chairman of a traffic committee of the association, with power to select his associates on the committee, by vote of the convention. Mr. Hodges outlined a policy which he believed the association should adopt, which includes active co-operation with the National Association of Sand and Gravel Producers. Mr. Hodges did not advocate changing the basis of the existing rate structure, but believes that if the statistics of tonnages and tariffs on crushed stone are collected and compiled, that the industry as a whole will be well able to prove that the general level of rates is high in proportion to all other commodities transported. He made it plain that to properly present the case to the Interstate Commerce Commission would involve a great amount of work and probably cost several thousand dollars, but that the results to be obtained were worth far more than the cost.

In the experience meeting on freight rates, B. D. Pierce, Jr., president of the Connecticut Quarries Co., New Haven, Conn., stated his minimum rate as 80c

John Rice

per ton for a 2 to 20-mile haul—about 2c per ton mile—while a Minnesota rate as low as one-tenth cent per ton mile was quoted, as the other extreme. These facts tended to show how very complicated the rate problem is.

Mr. Hodges believed that the railway operation problem would be solved in such a manner that the various state railway commissions would still have some jurisdiction over intrastate rates, but that there would be close co-operation between the Interstate Commerce Commission and these various state commissions. In this connection, J. C. King, of the Carbon Limestone Co., Youngstown, Ohio, stated that much could be done by individual operators in getting justice in particular cases of excessive rates.

The matter of car service was discussed at length, not only as regards the shortness of the present supply of cars, but the bad order in which many of them are furnished to shippers. Mr. Hodges stated that the Interstate Commerce Commission had ruled and the courts had sustained many times the regulation that the railways were compelled to furnish suitable equipment. He gave an instance where by refusing to accept dirty cars his company had persuaded the railway to furnish properly cleaned ones. But in these days of car shortage the quarry operators are of course glad to get anything that will roll on wheels, and he recommended that every operator keep a record of repairs made to cars by them and that a bill for these be sent regularly to the railway companies. While no instances could be cited where the railways had paid such bills, Mr. Hodges said the bills did have a wholesome effect in getting better conditioned cars and also they served excellently to offset certain unjust charges the railways sometimes made against the shippers. He believed that bills for car repairs made by the shipper could be legally collected by resort to the courts.

A telegram was received from A. G. Gutheim, of the car service section of the U. S. Railroad Administration, assuring the convention of his good will. The telegram made it clear that the present car service section of the Railroad Administration will be continued at Washington by the railway executives, in co-operation with the Interstate Commerce Commission, after the roads are returned to private management.

In compiling the per-ton-mile revenues to the railways from crushed stone, sand, gravel and slag traffic in conjunction with the other national associations, Mr. Hodges said the statistics for each material would be kept separate and only the grand totals used; it was not the intention of the traffic committee to lump these materials together promiscuously.

The question of types of cars suitable for the crushed-stone traffic was discussed and it was believed that pressure should be brought to bear on the railways to pay some heed to the necessary requirements instead of taking into consideration only the requirements of the coal trade. In this connection it is believed that the collection and proper compilation of the statistics of the crushed-stone industry as regards volume of business and capital invested and labor em-

ployed will show many enlightening things for the benefit of all.

Agricultural Limestone

C. R. Wagner, field representative of the National Agricultural Limestone Association, gave a most excellent presentation of the growing importance of this branch of the quarrymen's business and so thoroughly convinced them that he succeeded in gaining ten new members on the spot.

Prof. E. O. Fippin, head of the agricultural bureau of the National Lime Association, Washington, D. C., spoke in behalf of more active co-operation between the producers of agricultural lime and ground limestone, who in many cases are in both lines. The chief points that he made were the need for standard definitions and terms and the sticking to facts in the matter of propaganda and advertising.

He suggested that there are at least four common planks in the respective platforms of lime and limestone producers as follows: (1) Use of agreed-upon standard terms; (2) that the field was the biggest opening any one could ask for—at least an annual tonnage of 20,000,000 to 25,000,000 in prospect; (3) education of farmers in the fundamentals of soil liming practice; (4) recognition that no one yet knows all about the use of lime in agriculture.

Standardization of Crushed Stone Sizes

The paper of F. H. Jackson of the U. S. Bureau of Public Roads on the proposed standardization of crushed stone sizes is printed elsewhere in this issue. There was not much discussion of this subject. W. L. Sporborg, of the Rock-Cut Stone Co., Syracuse, N. Y., recommended that all of the membership join the American Society for Testing Materials, and have some hand in the game.

A. N. Johnson, consulting engineer of the Portland Cement Association, Chicago, Ill., gave an impromptu talk on the work done by Prof. Duff A. Abrams on concrete aggregates, which, if generally accepted, will largely do away with any need for standardizing the sizes of concrete aggregates. Mr. Johnson's proposition is merely to get away from the old standard mixtures of 1:2:4 and 1:3:6 and so forth, to such mixtures as will give a concrete of maximum density and compressive strength with the materials at hand. Hence, a concrete instead of being 1:2:4, might be 1:1.8:2.4. By varying the proportions of aggregate as regards the cement used, exactly the same strength concrete can be produced. Prof. Abrams has prepared a table of mixtures which makes it practicable to use a variety of mixtures to the number of 135, where only 4 or 5 standard mixtures are now used.

Crusher Sand

Mr. Johnson was questioned as to the value of stone screenings or crusher sand for fine aggregate. He said there was a practical difficulty in using limestone screenings which contained much fine stuff, due to the tendency of this powder to roll up into balls when wet. He said trap rock screenings were not subject to this difficulty. He said that as regards strength of concrete, there was no difference whether the fine aggregate used was natural sand or ground rock. B. D. Pierce, Jr., stated, however, that tests made for his company (Connecticut Quarries Co.) showed that concrete briquets made with clean trap rock screenings had a strength of nearly 200

B. D. Pierce, Jr.

per cent as compared with briquets of standard Ottawa sand.

In connection with the discussion of standard sizes and concrete aggregates, J. S. Spurrier of the Ross Engineering Co., Chicago, presented a description of the Ross drop-bar grizzly feeder and screen, which aroused much interest among practically all those present.

Electric Power in Quarries

The paper on the application of electric power to the operation of crushing plants is printed elsewhere in this issue. In the discussion of this paper it was shown that the whole tendency of the present, due both to the labor and fuel situation, is to install electric power wherever possible.

Standard Cost-Keeping

Gratifying progress was made toward the adoption of standard cost-keeping methods and exchange of cost data on quarry and crushing plant operation. The executive committee of the association will soon devise and send out for tabulation of the 1919 costs a blank which will divide the cost of producing crushed stone into seven main divisions as follows: (1) Depreciation and depletion; (2) General administration, including selling; (3) Labor; (4) Fuel; (5) Explosives; (6) all other materials; (7) Total.

It was decided to have all operators make a uniform charge of 10c per ton for depletion of quarry and depreciation of plant and buildings—this being shown by the general discussion to be a conservative figure. There was considerable difference of opinion as to the feasibility of determining the depreciation on each individual piece of equipment and machinery. John Rice, president of the General Crushed Stone Co., Easton, Pa., believed this was splitting hairs and entirely unnecessary. He estimates the life of his plants, their scrap value at the end of their life and the difference divided by the life gives the percent to charge off yearly for depletion, depreciation and obsolescence—all in one.

Exchange of cost data based on a similar analysis to that mentioned has already been practiced by the Eastern Stone Producers' Association, and the results have been very enlightening to all the members, not only in justifying fair price increases, but by helping in the efficient operation of the plants. It is hoped that with the same scheme, through the National Crushed Stone Association, the crushed stone men of the whole country can be similarly benefited.

In arriving at the results attained, J. J. Urschel, of the Woodville Lime Products Co., Toledo, Ohio, was very helpful. He presented, with the aid of charts, a cost-keeping method based on the standard of the National Lime Association, which his company uses. There is little difference between this and the form adopted, except that it is much more itemized and is divided into four general heads instead of six. In presenting this matter Mr. Urschel showed the actual costs at his own plant, which in 1919 amounted to an average of 79c per ton.

In the general discussion on cost accounting it was made clear that there are several phases to be considered and some confusion was caused by the different angles from which it was approached. R. W. Scherer, of the Union Lime Co., Milwaukee, Wis., showed that average cost data, such as that available from such comparisons as the one described above, were of very little value in comparing the efficiency of one plant

E. J. Krause

with another, or of comparing the operation of the same plant from week to week or month to month. The big variable in every case was the volume of stone turned out. Hence he suggested separating that part of the labor cost which represents a fixed charge, whether the plant turns out one ton or five hundred, and comparing the remaining factor for the effect of delays, etc., on cost.

Group Meetings

In addition to the general sessions of the convention, group meetings were held by the operators interested in agricultural limestone, fluxing stone, and railway ballast. The matter of railway ballast was gone into quite thoroughly and the results will shortly be issued to members of the association in the form of a bulletin, by the secretary. All of these group meetings developed much of interest and value to operators. The subjects of profit sharing and wages were not discussed at any regular meeting, but came in for many informal discussions.

Officers Elected

John Rice, president of the General Crushed Stone Co., Easton, Penn., was unanimously elected president of the association. In his inauguration address, Mr. Rice touched on association work in general and pleaded for a more unselfish viewpoint in organization work. Such associations—both of labor and trade interests—he said, must not only have broad enough vision to see their responsibilities, but must assume those responsibilities and use their power for the good of the country and of civilization rather than for selfish purposes. He emphasized the point that the greatest satisfaction in life came from service to humanity and urged that associations not lose sight of that fact. He touched incidently on industrial relations with labor and said that his company was just putting into effect a system of industrial democracy and profit-sharing.

B. D. Pierce, Jr., president of the Connecticut Quarries Co., New Haven, Conn., was unanimously elected first vice-president. Mr. Pierce spoke in a similar vein on profit sharing, stating that his company long ago adopted a policy of allowing its superintendents, foremen and sub-foremen to become shareholders in the company.

E. J. Krause, vice-president and general manager of the Columbia Quarries Co., St. Louis, Mo., was unanimously elected second vice-president. The following directors-at-large were chosen by the convention: W. W. Boxley, president of W. W. Boxley & Co., Roanoke, Va.; Thos. McCroskey, general manager of the American Limestone Co., Knoxville, Tenn.; A. J. Blair, vice-president and general manager of the Lakeshore Stone Co., Milwaukee, Wis.; W. Scott Eames,

A. J. Sullivan

general manager of the New Haven Trap Rock Co., New Haven, Conn.; Dwight E. Woodbridge, Mesaba Iron Co., Duluth, Minn.; and A. Acton Hall, president of the Ohio Marble Co., Piqua, Ohio. The board of directors re-elected A. P. Sandles, secretary and A. J. Sullivan, vice-president of the U. S. Crushed Stone Co., Chicago, treasurer.

Banquet

The annual banquet at the Seelbach Hotel was unanimously voted a huge success. A. P. Sandles acted as toastmaster, and at that job, as well as a considerable number of others, he has few peers. The guests included many delegates of the American Road Builders' Association and the American Good Roads Congress, which was held in Louisville the same week. Among the speakers were: Hon. F. C. Biggs, Minister of Highways of the Province of Ontario, Canada; D. L. Squires, president of the Canadian Good Roads Federation; Colonel Ritchie of the Motor Transport Service of the U. S. Army; G. P. Coleman, president of the American Road Builders' Association, and state highway engineer of Virginia; Frank Page, state highway commissioner of North Carolina; R. A. Meeker, former state highway engineer of New Jersey; J. H. McDonald, former state highway commissioner of Connecticut, and Dr. Arthur McCormack, secretary of the Kentucky State Board of Health.

Resolutions

A. J. Blair, retiring president, was given a rising vote of thanks for the splendid service he has rendered the industry in his capacity as first president of the National Crushed Stone Association. R. Brink Tyler, the genial and generous host, was given a testimonial both in the form of a resolution and in the form of a beautiful diamond scarf pin.

Resolutions were also passed recommending a return to the macadam type of road with 12 in. of crushed stone, in view of the high cost of so-called permanent types of roads; one asking the president, congress and railway officials to give the stone industry fair treatment in the matter of car service; one asking for the return of the railways to private management on March 1, according to the President's proclamation, and one in the form of a letter to the Interstate Commerce Commission, asking it to consider the present status of the stone industry in the matter of railway rates.

The financial statement of the treasurer showed a satisfactory cash balance, and during the last year the membership has shown a gratifying increase.

The date and place of the next convention remains to be fixed by the executive committee and the directors of the American Road Builders' Association.

A. P. Sandles

Electricity in Stone Quarry Operation

Amount Required for Rock-Crushing Operation and Cost Compared to Steam-Engine Power

By Walter D. Myers

Sales Engineer, Louisville Gas & Electric Company, Louisville, Ky.

UNLIKE MOST LINES OF INDUSTRY that can be and are established in convenient locations, accessible to all the advantages of labor, power, water and transportation facilities, stone quarries must, of necessity, be located where the deposits of stone are found, with the result that, with few exceptions, their locations are most inaccessible and remote from the advantages enjoyed by other lines of manufacture.

Due to this one reason more than any other, the application of electricity has not been so general as in other lines of industry. The distributing power companies, in many instances, refusing to consider large investments in transmission lines and other equipment, the development of electricity in this field has practically been left to the salesmen of electrical machinery, hence, the industry has been deprived, to a great extent, of the persistent efforts of the sales engineers of the service companies, who are the greatest developers of electricity in all of its uses. However, with this handicap, the substitution of electricity for steam power is increasing steadily in the stone quarries of the United States.

Electricity offers many advantages in works of this character. Almost every variety of stone-crushing machinery manufactured in this country is designed so that it can be driven by an electric motor. We have electric air channelers, electric hoists, electric locomotives, motor-driven air compressors, stone crushers, pulverizing mills, screens, pumps, electric-driven shovels or drag-lines; in fact, everything used in connection with the quarrying of the stone and making it marketable, can be driven with electricity.

Application of Motors to Rock Crushing Machines

We will deal only with alternating current, polyphase service, as that is fast becoming the standard service, not only furnished by the large power companies, but recommended by all consulting engineers for plants of 50 kw., or more.

There are two general types of induction motors which fulfill the requirements of rock-crushing plants, i. e., the slip-ring and the squirrel-cage types. The former, when furnished with drum-type, non-reversible controllers and resistance, is suitable for service requiring frequent starting under load, or the starting of loads with high inertia. The squirrel-cage type motor, equipped with compensator, is extremely simple and able to stand hard service. The absence of a commutator enables it to operate satisfactorily in locations where dust and dirt would prevent the employment of slip-ring motors, but its construction does not enable this type of motor to be started with very high torque, consequently it is not adapted to certain loads, as for ball mills, tube mills, etc.

It must be recognized that it is impossible to establish definite ratings for motors to drive certain machinery, as the conditions under which machinery is operated will vary in different plants from ten to one hundred per cent, causing a wide variation in power required. For general information, however, the following table is used, as a rule, for recommending the size of motors for the different machines used in connection with rock-crushing plants:

Gyratory Crusher	H. P. Required
No. 1	6
No. 2	10
No. 3	15
No. 4	20
No. 5	26
No. 6	40
No. 7½	17
No. 8	100
No. 9	140
No. 10	175
No. 12	200
No. 18	250
No. 24	300

Blake Crusher	H. P. Required
4x10-in.	4
7x10-in.	7
9x15-in.	12
10x20-in.	20
15x24-in.	25

Dodge Crusher	H. P. Required
4x6-in.	4
7x9-in.	8
8x12-in.	12
10x16-in.	18

Universal Crusher	H. P. Required
No. 1	2-3
No. 1-M	3-4
No. 2	5-8
No. 2-M	7-10
No. 3	7-10
No. 3-M	12-15
No. 4	15-20
No. 4-M	20-25
No. 5	25-30
No. 5-M	30-35

Symons Disk Crusher	H. P. Required
24-in.	18-25
36-in.	30-40
48-in.	50-65

Brainard Pulverizers	H. P. Required
No. 0	8-12
No. 1	12-16
No. 2	20-25
No. 3	40-50

Griffin Mill	H. P. Required
42-in.	50-60

Fuller Mill	H. P. Required
24-in.	10
33-in.	35
42-in.	50
57-in.	100

Prior to 1914 the cost of operating a power plant in most lines of industry did not receive very much consideration, but since that time, coal, labor, machinery and other items entering into the power plant costs have increased by leaps and bounds until it has grown to be a very important item in the yearly operating expenses; hence, the owners or stockholders, through their management, have begun to look upon the power plant with some consideration and are investigating the advisabilty of substituting other forms of power, and, naturally, turn to the consulting engineers or large power companies for advice.

The electricity required in the operation of rock-crushing plants varies from .34 kw.-hr. per ton of rock crushed to 3.3 kw.-hr. per ton of rock crushed. The wide variation in energy is due to a great extent to the character of the rock, and the quantity of air required in drilling, and the method of drive, i. e., individual or group.

Cost of Operation

As an illustration, I have made up a comparison between the cost of operating a typical stone-crushing plant with purchased power and operating the same plant from an individual steam plant:

Plant crushing limestone for ballast,
Employing 35 to 40 men,
Operating 10 hours per day,
Capacity, 600 to 700 tons per day,
Connected load in motors, 345 h.p.
Individual drive.
Plant operated from March 1 to December 1.
Plant idle from December 1 to March 1.
Average monthly consumption during months plant is in operation, 14,000 kw.-hr.
Electric energy, 3c per kw.-hr.
Monthly minimum required, $172.50.
Cost to operate plant with purchased power:

Electricity, 126,000 kw.-hr. per year @ 3c per kw.-hr.	$3,780.00
Minimum, 3 months plant is idle	517.50
Yearly operating cost	$4,297.50

YEARLY OPERATING COST WITH STEAM POWER

756 tons coal @ $4.00 per ton	$3,020.00
Labor, fireman, $3.50 per day	945.00
Oil, waste, boiler compound and misc.	150.00
Interest, 6%; depreciation, 7%; taxes, insurance and upkeep, 3%; or a total of 16% on $10,000 investment in boilers and building for power plant	1,600.00
Yearly operating cost	$5,715.00

In my assumption I have used the

*Prepared and read before the Third Annual Convention, National Crushed Stone Association, February 10, 1920.

maximum prevailing rates usually quoted for service in such quantities. I have not included the cost of steam engines for the reason that the cost of motors for the electric-driven plant will just about offset the cost of engine units. I have not included the cost of an engineer in the steam-operated plant for the reason that the claim will be made (though not always true) that an electrician will be required in the electric-driven plant.

Aside from the actual saving of over $1,400.00, or 25% per annum, as shown in operating cost, you will find that electricity has many advantages. It can be applied at the point where the power is needed; it can be so distributed that no part of the plant is dependent on the other for operation. The throwing of a switch by an unskilled laborer will start the plant in operation. The money invested in a power plant can be invested in producing machinery and earn many times the 6% allowed for interest charge.

In conclusion I want to express my deep appreciation and the appreciation of the National Electric Light Association for the privilege of having the opportunity of presenting to your convention the advantages of the product I represent, and solicit of you the consideration of the sales engineer in your community, knowing that if he merits the position he holds that he will readily prove to you that your interests are mutual.

Standard Sizes of Crushed Stone*

What the American Society for Testing Materials and the U. S. Bureau of Public Roads is Aiming to Accomplish With the Assistance of the Producers

By Frank H. Jackson, Jr.
Assistant Testing Engineer, U. S. Bureau of Public Roads, Washington, D. C.

I AM VERY GLAD, for two reasons, to have the opportunity of saying a few words to you on a subject in which I know you are all interested—standard commercial sizes of crushed stone. In the first place, I want to tell you of the work already done by out committee (American Society for Testing Materials) as well as other organizations along this line; and, in the second place, I want to obtain, if I may, your ideas on certain phases of the question regarding which the producers are best qualified to judge, for I realize that we must have the whole-hearted co-operation of the crushed-stone producers before we can hope to put over anything of really practical value. I am not going to waste any time in rehearsing the arguments in favor of a standard system of stone sizes. You are just as familiar with them as I, and moreover, many of you can undoubtedly call to mind incidences where the lack of such a system has cost you both time and money. Suffice to say, that although the question has been discussed in a more or less spasmodic fashion for some time, it has only been within the last year that we have really gotten it under way, and we are not going to stop until we have secured the general adoption of a practical and simple series of standard stone sizes.

Then, too, the increasing demand for crushed stone with which to construct the roads called for under the 1920 program will surely result in a shortage of this material unless strenuous steps are taken to increase production, and I know of no better way to increase production than for engineers and producers to get together and decide on the minimum number of commercial grades required for legitimate needs—draw definite specifications for each grade worded so clearly that there will be no question as to just what is meant and, above all, make these specifications practical from the standpoint of the economical commercial production of the material.

It has been my experience that this latter point has been often overlooked in drawing up specifications. An engineer will specify a very closely graded product which meets his particular fancy without a thought as to whether such a product can be economically produced. I have in mind a specification in which a grade of pea stone is required to all pass a ½-in. screen, and to have not more than 5% pass a ¼-in. screen. How many plants could produce such a material economically? It is by the elimination of such impractical requirements as these as well as by making such sizes as we do specify as open as is consistent with good practice that we can best aid in increasing production. I can see, therefore, a very real and practical benefit to be derived from early action on this subject.

Now just a word about what has already been done. During the summer of 1917 the U. S. Bureau of Public Roads commenced a field survey of current practice covering the production of crushed stone in the New England and Middle Atlantic States. Some 100 commercial quarries were studied and data was collected for use in connection with this subject. This survey was continued during the next year in Ohio, as well as in some of the southern states. The information obtained is very interesting in showing the bearing which the various factors influencing the production of crushed stone have on the grading of the final product. The data have been published in "Public Roads," the monthly magazine of the Bureau. Among other things, this survey showed that, although a few of the states, notably Ohio and New York, have standardized sizes, there has until this year been no effort made to secure agreement among even contiguous states.

The typical specifications of the Bureau, which were issued shortly after, contain specifications for crushed stone sizes adopted as a result of this survey. Since this time a number of States have adopted these specifications.

During the summer of 1919 the Association of Mississippi Valley State Highway Departments appointed a committee to look into the question of commercial sizes of crushed stone for use in these states, Prof. T. R. Agg, of the Iowa State College, being appointed chairman, while on November 18, under the auspices of the Pennsylvania State Highway Department, engineers and producers from New York, New Jersey, Pennsylvania, Delaware and Maryland met in Philadelphia to talk over the question as applied to these states. The American Society for Testing Materials' committee on commercial grades of broken stone and broken slag, which I represent, was formed last fall. It consists of Prof. Agg, H. S. Mattimore, Chief Engineer of Tests, Pennsylvania State Highway Department; H. J. Love, Secretary, National Slag Association, and myself. This is the first organization which has attempted to consider the question from a national standpoint.

It is exceedingly fortunate in having in its membership both Prof. Agg and Mr. Mattimore, as it hopes in this way to co-ordinate the work of the other organizations just mentioned. The committee also felt that the stone producers should be represented, and steps have been taken to bring this about. The committee has held one meeting at which several of the difficulties involved were discussed and some conclusions reached. I will try to briefly summarize these conclusions in order to let you see how we

*Paper delivered before the National Crushed Stone Association Convention, Louisville, Ky., February 10, 1920.

stand on the question. The first question to engage the attention of the committee was the proper method of specifying stone sizes.

As you know, there are two general methods in use at the present time. One of these uses, the actual grading of the stone, determined by mechanical analysis, as the basis of the specification, while in the other the diameter of perforations in the plant screens over which and through which the material passes is used to designate the sizes desired. It was the sense of the committee that the latter method, which has been used recently in a number of state specifications, notably in Pennsylvania, is unsatisfactory as well as misleading, on account of the numerous factors which influence the efficiency of the revolving screen. It is true that a number of these factors, such as speed and pitch of screens, are fairly uniform, however, even in plants which apparently have been well designed, the tendency has been to install screen sections of only sufficient length and diameter to take care of the average output of the crushers rather than the maximum which may be delivered at intermittent intervals. This fact has undoubtedly a great deal to do with the lack of uniformity in grading of successive shipments from a given plant of nominally the same grade, because we all know that the greater the ratio between the total volume of stone in a screen and the area of the screen, the more efficient is the screening operation.

Until we can be assured, therefore, that all screening plants will be designed and operated to secure the maximum efficiency possible, the committee feels that it would be best to specify size requirements on the basis of actual size of product as determined by mechanical analysis. Then, too, a standard system of sizes designed to cover the entire country and including products of widely different physical characteristics and consequently obtained by entirely different screening methods cannot hope to adequately limit the sizes required by specifying the character of the screening operation.

We feel that the standardization of methods of producing stone should be left to the producers and that it can and will be accomplished by them if the actual sizes required have once been determined by engineers. The argument has been advanced that producers must be told just what sizes of screens to install in their plants. It seems to us that such an argument is a reflection on the intelligence of the producers. It stands to reason that the average producer is much better qualified by reason of his familiarity with local conditions to determine the screen installation best suited to produce a given product.

Another point discussed by the committee was the question of tolerance to be allowed in specifications. This is a point on which we would like to have the ideas of the producers. In general, the committee believes that experience as well as results of numerous actual tests have shown that the maximum efficiency of revolving screens cannot be safely put at over 85 or 90 per cent; that is, it is unfair to require that more than this proportion of the grade required shall actually lie between the sizes specified. Furthermore, we all know that in order to produce even this 85 or 90 per cent efficiency it is necessary to install revolving screen sections with perforations slightly larger in diameter than the perforations in the laboratory screens with which the product is to be analyzed. For instance, if we specify that a certain grade of stone be between ¾-in. and 1¼-in. in size and that 85 per cent of a sample of this product must actually lie between these sizes when analyzed with laboratory screens, the operator knows that he must install screens with perforations somewhat larger than the sizes required. Just how much larger, is a matter for each producer to work out for himself, and will depend upon the efficiency of his plant and the character of the stone he is crushing.

The matter of nomenclature was also discussed. We feel that this is important simply as a matter of standardization. It does not make much difference what we call a product provided everyone calls it by the same name. As a matter of fact, the numbering of sizes is open to serious objection, due to the large number of systems in use now.

We also talked over the question of the insertion of intermediate size requirements in specifications for the purpose of insuring uniformity in grading of mixed sizes, especially for concrete. It was the consensus of opinion that at least one intermediate size requirement should be inserted, close enough to prevent the use of material which has become seriously segregated, and yet open enough to be capable of practical enforcement.

As a result of its work to date, the committee has prepared a tentative series of standard sizes of crushed stone for use in road construction and in concrete. We propose that commercial plants be ordinarily equipped to turn out five elementary sizes of stone. These sizes to be as follows: Fine screenings or that portion of the product of the crusher passing a ¼-in. laboratory screen; chips, or dustless screenings, the product of the crusher between ¼-in. and ¾-in. in size; 1-in. stone, the product of the crusher between ¾-in. and 1¼-in. in size; 2-in. stone, that portion between 1¼-in. and 2½-in. in size; and 3-in. stone, that portion between 2½-in. and 3½-in. in size. Furthermore, at least 85 per cent of each size actually to lie between the limits specified.

It is felt that practically every standard type of road in which crushed stone is used can be built with these sizes. For instance, 0 to ¼-in. size could be used for any one of the various purposes for which fine screenings are adapted, the ¼-in. to ¾-in., or ½-in. stone can be used for carpet coating waterbound macadam roads or as fine chips in the bituminous macadam type. The ¾-in. to 1¼-in. size is suitable for use as in intermediate or chinking course in bituminous macadam, the 1¼-in. to 2½-in. size in either waterbound or bituminous macadam wearing course, and 2½-in. to 3-in. size in the base course. Various combinations of these sizes will suggest themselves as follows: A mixture of the two finer sizes may be used as coarse screenings for waterbound macadam road construction. A mixture of ½-in. and 1-in. stone is suitable for bituminous concrete wearing course, binder course in sheet asphalt or reinforced concrete, and a combination of either the ½-in., 1-in. and 2-in., or the 1-in. and 2-in., for concrete road construction as desired. Most of these sizes, it will be noted, conform very nearly to general practice. The committee is well aware that just as good roads can and have been built, using differently graded stone. It is felt, however, that satisfactory results could be obtained using the sizes here suggested. Moreover, if adopted by all parties concerned they would have the very great advantage of being standard, thus doing away with the endless confusion and misunderstanding so common in the past.

Form of Specification

It is the intention of the committee to send in the very near future to each producer of crushed stone in the United States, as well as to all of the State Highway Departments, a suggested series of standard sizes, together with methods of specifying and tolerances to be allowed. Each producer will be asked to state frankly his opinion regarding the possibilities in the way of economical production of the various grades, and the various states will be asked to criticize specifications with a view to modifying their own to conform therewith.

Standardization of Gravel Sizes

THE SUBJECT of standard specifications for gravel was discussed at some length at the convention of the National Association of Sand and Gravel Producers at Chicago, February 12 and 13. Some of these data will be found on another page of this issue and more will appear in a succeeding issue.

Expand National Sand and Gravel Association's Activities

Leaders in the Industry Determine on Aggressive Policies

TO STRENGTHEN the local organizations and to give the national association the benefit of the experience gained by these local organizations a radical change in the method of conducting the activities of the National Association of Sand and Gravel Producers was proposed on the floor of the convention, Chicago, Feb. 11, by M. D. Schaff, president of the Illinois association, which is the largest and strongest local unit in the national association.

Mr. Schaff's suggestion was in effect that the National Association be comprised essentially of the secretaries of the local associations, who were to choose from among their number one to act temporarily as chairman and ex-officio business manager of the national association. His resolution was referred to a committee of ten, consisting of John Prince, Kansas City, Mo.; M. D. Schaff, Springfield, Ill.; Floyd Goodrich, Humboldt, Ia.; J. H. Allen, Lincoln, Neb.; G. J. Nattkemper, Terre Haute, Ind.; Guy C. Baker, Greenville, Ohio; C. N. Ray, Detroit, Mich., William McDermott, Knoxville, Tenn.; C. L. Ruffen, Fredericksburg, Va., and A. W. Dann, Pittsburgh, Pa., whose report is given elsewhere in this article.

Harry Donnelly, of the Ohio Ballast Company, Cincinnati, Ohio, who has been president of the Association for the last three years and whose untiring efforts have been largely instrumental in the upbuilding of the organization, presided. The address of welcome was made by Ben Stone, business manager of the Illinois Sand and Gravel Producers Association and a national figure in the sand and gravel industry. Mr. Stone's paper, which reflects the ideals of the coming type of business man, was in part as follows:

Ben Stone's Address

Isn't it fine that we have reached a point in industrial development where we can come together as competitors and have a free interchange of thoughts and ideals, with friendly discussions of the problems that are common in our daily business affairs? I think it is, and your being here indicates that you agree with me.

Now, let us see if we can determine what it is that has brought us together. Many, no doubt, are here because of a desire to learn something from which they can benefit—it is hoped that this is true of the majority; others, it may be, have come just to meet the boys, make new acquaintances, talk things over in a general way and learn what is going on in the sand and gravel industry throughout the country. * * *

It has been said that the idea of the modern trade association came out of the war. That is not true. The war merely blazed the trail and showed the way to organized co-operation in industry by creating a condition that demanded collective effort and common service. The idea itself is older than the dawn of history. It was given to the Chinese people by Confucius, thousands of years before Christ; it was incorporated in the law of Moses; it has been recognized as a fundamental law by great thinkers in all ages. It is, in fact, the very foundation of all human accomplishment, and is bound up in one word—*Service*.

In the past we have been pleased to think of business as something apart from our best impulses. * * * But we are beginning to realize that business, after all, is essentially human. * * * The trend of modern thought is away from competition for private gain and toward co-operation for common service, and so we find men and women in all walks of life organizing for the general purpose of developing co-operative effort in connection with matters of common interest. It is not strange that co-operation has finally begun to find its place in modern industry. * * *

Co-operation is commonly spoken of as the foundation of the modern trade association, and so it is; but in the completed building we must have the steel of experience, the stones of practice and the mortar of service; and I am going to say to you that your real income from your association membership will be in exact proportion to your active service in the carrying out of its purposes and undertakings.

In its fullness, business service is much broader than the establishment of special features in an individual organization, though that is highly commendable. Applied to management, it implies service to employees; to customers, to the community and to the state, it means giving high value at a price consistent with best interests of all concerned. Applied to organization, it demands of the workman a sense of individual responsibility and loyalty to his job; a day's work for a day's pay is not enough. True service gives more, recognizing the truth of the old adage that "the man who never does more than he's paid for never gets paid for more than he does." It demands of the individual in business, as well as in other walks of life, a tolerance toward the opinions and actions of other men. * * *

We are passing through a very critical period. Many strange and startling things are happening in the business world and we are facing issues that involve the very fundamentals of human relationships.

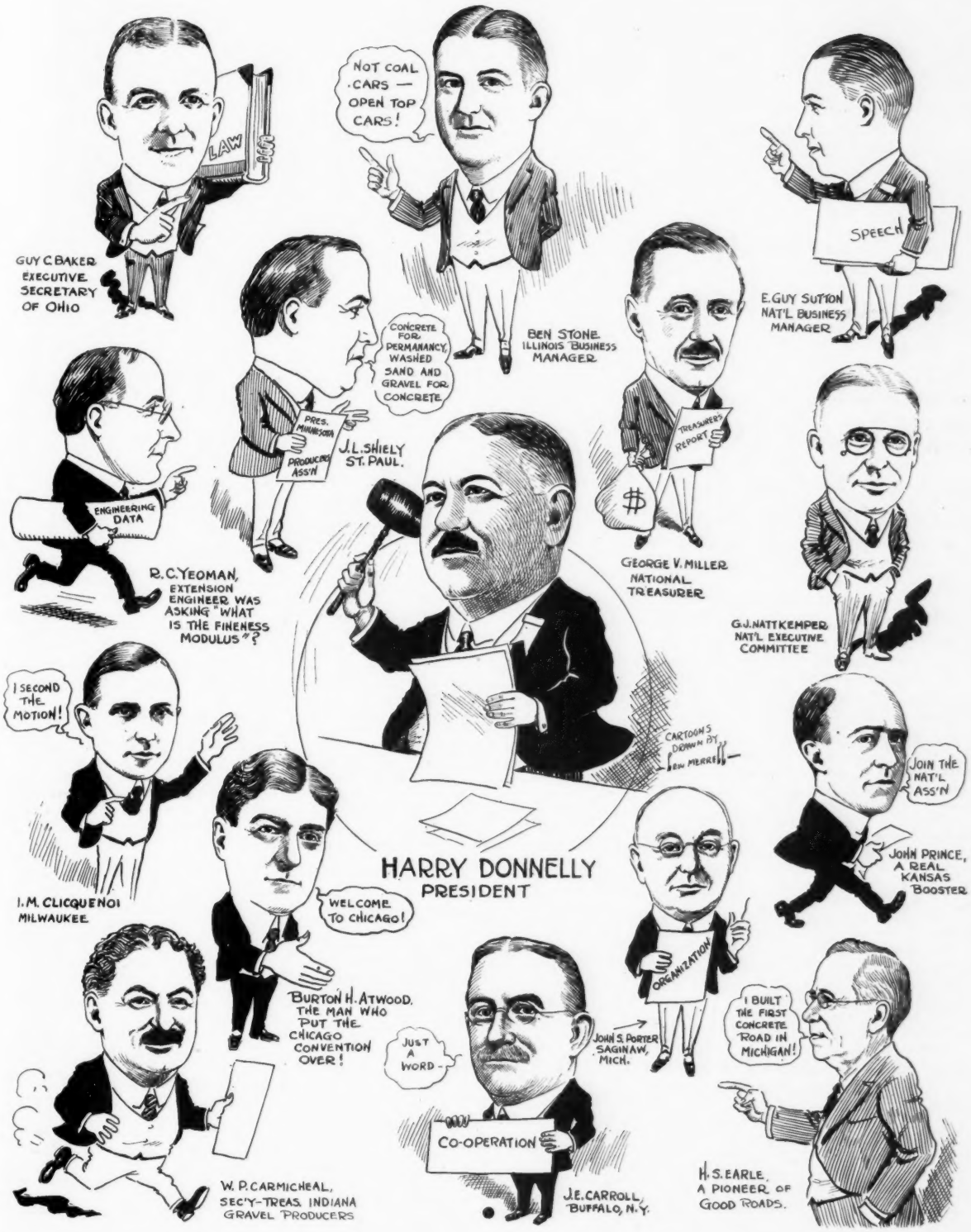
Since the signing of the armistice a great deal has been said and written about the new conditions that have grown out of the war. We have talked almost without ceasing about our new and mysterious problems. We have referred to many of them as being vital. A great variety of conflicting opinions have been expressed as to cause and effect—mostly effect. I think it is apparent that very little real thought has been given to cause. And so we have gone along from day to day, making no noticeable approach to the real issues. We have sought relief through legislative enactment. Individually and collectively, we have clamored for priority and special privilege; but we have had no assistance and little sympathy from the Federal Government. An election is at hand, and the folks down at Washington have been too busy fixing things so they might be re-elected to give serious thought to such matters as assisting the country's business to readjust itself.

Individual and collective selfishness has been running wild throughout the world, as a railroad train without a pilot. Economic laws have been disregarded—in many instances recklessly transgressed. It is time to take stock. Sure, but who's going to do it? I would not have you think that I am an alarmist; on the contrary, I have a very firm conviction that in the end all things will work out as they should. I do not mean that we should do nothing. Action on our part will come of a clear conception of necessity. * * *

The real job before us today is to adjust our affairs and transactions to conform to the world-old principles of economics, for we cannot change these fundamentals of nature by man-made contrivances. * * * The problems that are giving us the most grave concern are world-wide in scope and must be considered in the light of their extensive influence. Otherwise whatever may appear to be a solution cannot be of more than temporary benefit, and might cause a stubborn infection.

We must be reminded we cannot escape the influence of European affairs. No one can say what will result from the turmoil and strife that is rampant over there * * * Business in this country cannot escape its influence, and whatever may be the general effect it will be reflected throughout the sand and gravel industry. We hope it may be averted, or, if it must come, that it may be passed without serious effect.

But feeling these things, it would seem that we have about reached the point where we must stop, look and listen. Each man must sit tight in the boat; he must give serious thought to the welfare



of his business, not only in respect of his own selfish interests; but in the light of his newly discovered relationship to employees, customers, competitors and to the public.

This expresses modern business service. It is not altruism—it is good business. It points the road to progress and it is only through such co-operative service that your own best interests and the welfare of the industry at large can be protected and made to grow.

Concrete Roads

H. S. Earle, president of the Genesee Gravel Co., Detroit, Mich., spoke on "Concrete Roads Yesterday and Today." Mr. Earle holds the distinction of being the highway commissioner of Michigan at the time when the first concrete road in the United States was constructed. The material used was sand and gravel, and in spite of the heavy traffic which goes over this road, it is still in good shape.

The biggest item of repair has been to keep the shoulders up because the road was not made wide enough.

During the next ten years Michigan will spend $200,000,000 for good roads. In addition to this the amount of construction going on in Detroit is far in excess of any year in history. The material men are far from able to supply all the required material.

As a tribute to the work Mr. Earle has done to promote the building of concrete roads, a very fitting monument has been dedicated to him by Wayne County, Michigan. This is a stretch of 200 miles of concrete road—"Earle's Road"—leading out of Detroit. The project is now under construction.

Secretary's Report

Mr. Sutton gave a remarkably complete and forceful review of the activities of the association, which for lack of space we are compelled to give in abbreviated form. Much of the report dealt with the history of the fight to prevent freight-rate increases and the struggle for car service and the various difficulties involved. This history and the efforts and accomplishments of the association in solving these problems are well known to readers of ROCK PRODUCTS.

The other activities of the national association all readers may not be so familiar with. Mr. Sutton in his report stated:

A campaign for membership has been conducted throughout the year, both by correspondence and by holding meetings in various states. The latter method has proven most effective, both in securing new members and in bringing direct to the producer the advantages to be derived through association work, which will tend to the formation of state or district associations, which are highly desirable for handling local conditions. It will be the policy of the national association to encourage the organization of state associations with the idea that eventually the larger organization will be made up of such units. Several state associations have already joined as a body in accordance with the provisions of the present constitution.

Other activities have been co-operation with the Indiana association in the matter of concrete tests and the publication of a monthly magazine.

Preliminary steps have been taken toward gathering reliable statistics respecting the industry, and in this regard we hope to enlist the assistance of the Bureau of Geological Survey, the Bureau of Mines and the Bureau of Public Roads. A number of states have already made special surveys of their sand and gravel deposits. This should be encouraged in all states and the information made available to the industry and to the public.

The questions of cost accounting and business methods are being studied with the view of arriving at uniform practices among producers with respect to these important business factors.

The sand and gravel producers are being required to pay higher rates on compensation insurance than many other risks of greater hazard. When this fact is mentioned to insurance men they invariably respond that the experience record of the industry covers so comparatively a short time that it is impossible to justify a lower rate. Preliminary arrangements have been made for taking up this matter with the National Workmen's Compensation Service Bureau, which has to do with the establishment of conference rates, which are also a basis for rates under the mutual or reciprocal insurance plans.

The national association has been active in attempting to secure railway legislation that at least would not be detrimental to the welfare of the industry. Particular attention has been given in trying to prevent the enactment of a provision in the proposed legislation, wherein special methods are prescribed for the distribution of cars to coal mines during a period of car shortage, believing that the effect of this feature of the bill, regardless of the intent, will be to perpetuate the discrimination against the shippers of aggregates which has prevailed during the past two years.

The industrial unrest, which seemingly pervades the world, is sufficient reason for giving serious thought to the labor situation. The sand and gravel producers because of the nature of their business have had little labor trouble, but difficulty in this respect may be anticipated, moreover, we are not self-sufficient, but are dependent upon the successful continuance of all commercial enterprises. Little has been done by the national association in attempting to establish uniform practices in dealing with labor employed by the members of the industry, but there is need for concerted action.

Much effective work already has been accomplished in co-operation with other national associations, especially the Portland Cement Association and the Federation of Construction Industries, and it is planned to extend this co-operative relationship with other allied national trade associations, which will prove of great advantage in handling matters of common concern.

The war brought about the standardization of many articles and materials, and this impetus to uniformity of products is being extended to all fields of manufacture. The question of standard sizing has been discussed for some years and from many angles by sand and gravel producers, and by those furnishing equipment for the production of these materials. It has now been proposed by the Association of State Highway Officials to establish a standard of sizing for sand and gravel for highway construction. The association has been given splendid opportunity for presenting the producer's side of the problem, and the suggestions submitted have been received with favorable comment. In this, too, the association is working in conjunction with the American Society for Testing Materials and the Bureau of Public Roads.

As is apparent from the foregoing analysis, the work of the national association for the past year has been distributed over a very wide field. None of the problems and conditions which have been mentioned should be neglected, but while the association is growing in numbers and finances, in my opinion it will be necessary to devote our attention more vigorously and intensely to the more imminent matters that affect the industry. I would therefore recommend that the association give prime consideration and attention to the following problems and activities during the ensuing year:

First. To extending the membership of the association that it may be truly a representative body and have sufficient funds to perform its work effectively. This can best be accomplished by coming in contact with the producers. It will be desirable therefore to hold meetings in different sections of the country so that all producers may be reached directly.

Second. It is of vital importance that a campaign of education be started at once, proclaiming the good qualities of sand and gravel for the purposes for which they are used.

Third. Railroad legislation, while still pending, is taking tangible form, yet it will not be out of place at this time to venture opinion as to what the future holds with reference to freight rates. One thing is certain: The inequalities brought about by General Order No. 28 will remain in effect until changed by competent authority, for the bills passed by the House and Senate, respectively, each make such provision. Both the Esch and the Cummins bills encourage, if not actually require, the filing of petitions by the railroads for rate increases.

Furthermore, regardless of additional authority, the railroads have the privilege under existing law to file schedules of rate changes with the Interstate Commerce Commission at any time, and that they are proposing to do, as already announced by the Association of Railroad Executives, immediately following the termination of federal control, so that there is no doubt but that an increase will be sought. The petitioners most likely will ask for a percentage increase in order to facilitate the handling of the application. The amount, of course, is entirely speculative, though it will probably be from 25 to 40 per cent.

If a general percentage increase is proposed on sand and gravel, the matter at once becomes a national issue. If rate groupings are formed, as contemplated by the provisions of the Cummins bill, and which feature of the proposed legislation has practically been agreed upon by the conference committee, the rates of each group will be established so as to earn at least the minimum return guaranteed by the measure. It is possible, but not likely, that rate advances in some groups will not be necessary to provide the guaranteed return. (Incidentally, this provision will result in lack of stability of rates, since they will be subject to change from time to time as the Interstate Commerce Commission may direct, for it will be impracticable for anyone to say just what rates will yield the required revenue necessary to meet the guarantee; so if rates are either too high or too low, adjustmnts must be made.) It may be assumed, however, that broad, general principles will be fixed by the Interstate Commerce Commission to conform to the rule of rate making prescribed which will be applied in the determination of rates for each group. Moreover, we may conclude that the Interstate Commerce Commission will design and put in operation a definite method for arriving at a rate structure covering any given commodity. Assum-

ing that these predictions are correct, it will be necessary to gather and assemble reliable data as a basis for establishing what the sand and gravel traffic should bear in comparison with other commodities, and to substantiate any claims that may be made as to the injustice of proposed advances. This information should be collected and tabulated by the national association with the assistance of state organizations, under the advice and direction of a traffic attorney of recognized ability, and held ready for use as the occasion may demand. In this connection it must be borne in mind that we will not now be dealing with a body of self-interested railway officials as opposed to an equally self-interested body of producers, but with the Interstate Commerce Commission, which will hear and render decision in judicial capacity upon the presentation of facts.

Just how far the national association may go in handling the rate proposition for the entire industry is a matter of development, but with the likelihood of the railroads asking for a blanket increase and acting as a unit, as they will through their national association, is it not logical to conclude that the question will have to be attacked in like manner by the sand and gravel shippers?

Fourth. Important as the freight rate question may be, it passes into comparative insignificance when we approach the matter of car supply. It would give me the greatest degree of satisfaction if I could with sincerity hold out to you a faint hope that conditions with respect to transportation service would be perceptibly better during 1920 than has been the case during the year that has just passed. You frequently hear it stated that as soon as the railroads are returned to private control the situation will be promptly improved. Be not deceived thereby!

The railroads, so far as operation is concerned, will be in the hands of the same officials after federal control is terminated that are running them now, though they will be paid by the corporations instead of the government. Then, too, the proposed guaranteed returns to the railroads will not stimulate constructive enterprise and efficiency in management any more than government ownership. The employees will not be a different set of men on March 1st than they were on February 29. Their disposition or the nature of their demands will not be changed. New cars and additional locomotives will not spring up over night.

In other words, government operation of the railroads, good or bad as it may be in principle or in practice, is not the fundamental reason for the failure of the railroads to meet transportation requirements today. Neither is the labor feature of the problem, serious as it is, the underlying cause. The truth of the whole matter is simply that the transportation demands of the country have increased faster than the transportation facilities. Until this unbalanced relation can be adjusted, sand and gravel producers, as well as other shippers, must face and endure inadequate service from the railroads. How long it will take to bring about a proper adjustment is problematical. The very best that we may expect in the meantime is to receive the proportionate share of cars to which we are rightfully entitled.

Under the provisions of both the Esch and Cummins bills, the Interstate Commerce Commission will have authority to regulate the distribution of cars. This function will probably be administered through a car service section similar to that now in existence, the establishment of which has already been decided upon by the Association of Railway Executives. This means that the distribution and interchange of cars will be under the jurisdiction of a centralized body, and that shippers of a given commodity will look to that source for rules and regulations that will protect their interests.

While no doubt local officials will have more authority with reference to furnishing cars than they have had under federal management, yet they will be subject to the central agency. There will naturally arise a keen competition for cars between shippers of various commodities and especially will this be the case between the coal operators and the producers of mineral aggregates, as the former, through their well-financed organization, will employ their usual tactics in attempting to obtain preferential treatment. Is there any question as to the prudence of our national association being prepared to meet the situation?

In submitting this report I have tried to outline to you as briefly as possible the work of the association for the past year, and to indicate to you some of the problems that the national association will be called upon to handle during the coming season. We had looked to 1919 as a year of reconstruction; we had hoped possibly without serious thought that the chaotic condition resulting from four and one-half years of war could be brought to order again in less than one-fourth that time. We neglected to consider the law of compensation; we gave little attention to the fact that it is easier to tear down than it is to build up. The real adjustment period is before us. There was never a greater need for an effective organization than at the present time; we must have members and we must have greater finances. In this the present membership is interested, for the more formidable the organization the greater the benefits that will be derived from the money that each one invests. In conclusion, therefore, I appeal to you not only to give your hearty and unqualified support to the association, but to use your influence in every way possible toward gaining for the association the strength and backbone which it needs in order that the problems and conditions of the day, so far as they affect the advancement of our industry, may be made successful.

Tests of Sand and Gravel

A paper on "Tests of Sand and Gravel Concrete" was delivered by Dr. W. K. Hatt, president American Concrete Institute. This report was concerned with the various methods of proportioning materials for concrete and the results of some tests on Indiana sand and gravel made at Purdue University. Conclusions were drawn from the work of Messrs. Young and Edwards of Canada and D. A. Abrams of the United States.

One of the outstanding points of Dr. Hatt's paper was that it is the duty of engineers to adapt the various deposits of nature so that all—or more nearly all—of the material may produce a strong concrete. This could be done by using the smaller sizes of material with an added amount of cement. The concrete gravel tests were illustrated by lantern slides. In the discussion, which was led by R. C. Yeoman, extension engineer of the National Association, more detail of the tests on Indiana sand and gravel were brought out. Mr. Yeoman was in direct charge of this investigation.

Labor Problems

Under the subject of industrial relations, a very well prepared paper was submitted by F. D. Coppock, president of the Greenville Gravel Co. This paper is printed in full elsewhere in this issue.

V. O. Johnson, of the Lincoln Sand and Gravel Co., gave an interesting talk which dealt with profit sharing plans. While Mr. Johnson believes that all labor trouble is not capable of a general solution, it is felt that a real profit-sharing plan will furnish a community of interest for both the employed and the employer. Since the employer furnishes the capital and the employed supply the means of converting capital into production, Mr. Johnson states that the employees should expect to share in the profits and the employer should expect to give a share. A true profit-sharing plan, it was stated, should be one which will appeal to all types of employes so that there will be a growing interest in the management, it should be simple so that all can readily see the working of it, and there should be a method inaugurated whereby the laborer may know from day to day what his work will bring him.

In the absence of J. K. Jensen, Janesville Sand & Gravel Co., Janesville, Wis., a paper prepared by him was read by F. E. Lane, sales manager. The trend of this paper was that industrial strife can be reduced by both sides applying the Golden Rule, or by a liberal meeting of labor and capital. Mr. Jensen is a believer in some sort of a profit-sharing plan and one has lately been applied to the two plants at Janesville with good results.

R. A. Rotstein, the Beloit Sand & Gravel Co., started an open discussion by describing the bonus system which has resulted in perfect accord at their plant since 1917. This plan allows the workmen each five cents and the superintendent twenty-five cents per car of material turned out. Mr. Rotstein states that the men produce enough more under this plan to offset the bonus. They work overtime cheerfully, have divided the noon hour so that half of the men are at work all of the time, thus the plant is not closed down at noon. A plan to pay from five to ten dollars for every acceptable suggestion has also been of benefit.

Mr. Harry Donnelly said that the Ohio Ballast Co. has had no labor trouble for three years and attributes this condition to the plan whereby employees are given at Christmas time a bonus of 6% of their annual pay.

Transportation

A. G. Gutheim, of the division of car service of the Railroad Administration, addressed the convention on the general subject of car service. In a large measure, Mr. Gutheim indirectly confirmed the statements made by Secretary Sutton in his annual report. He explained as best he could the reasons for the present conditions and expressed the opinion that the first move of the railway executives after the return of the roads would be to cut expenses and increase efficiency, to get back as nearly as possible to the former operating ratios of earnings and expenses.

As to the supply of cars, Mr. Gutheim estimated that at least 100,000 new cars a year were needed to maintain the total of 1,000,000 which were in use before the railways reached their present financial straits. Since the beginning of the war probably less than 200,000 cars have been added to make good the loss from wear and tear, consequently there is an actual shortage of cars for even pre-war business.

Mr. Gutheim admitted that in the matter of car service discrimination the sand and gravel industry had "got it in the neck." The inference from the examples he gave of how these discriminations came to be made, proved quite conclusively the value of a strong national organization in pressing demands at Washington.

He said it had been practically decided by the railway executives to retain the car service section office at Washington, but he could not predict how the operation of it under private management would work out, when the private interests of the various roads clashed. Pending railway legislation will give the Interstate Commerce Commission some jurisdiction in the matter of car distribution.

The ways in which every producer could help in solving the car shortage problem he said were to themselves buy coal the year round, and to do everything possible to spread the gospel to that end. Most of the present and past car shortage problems, as they affect the sand and gravel industry, are due to the fluctuating production of coal. Could a uniform production be attained the open-top car situation would be helped greatly. Likewise every producer can help by loading cars to maximum capacity and thus save in the number of cars required to handle a given tonnage.

Mr. Gutheim would not commit himself very much on the subject of rates other than to say that much difference of opinion existed among the railway executives as to the need of any increase or of the amount of increase needed. In concluding, he left the impression that the railway executives must of necessity do everything possible to render maximum service at a minimum of price in order to offset the propaganda for government ownership.

Report of Committee of Ten

The committee of ten on the general policy of the National Association reported as follows:

Your committee, appointed for the purpose of giving consideration and recommending the general policies for the guidance of the association for the coming year, beg to report as follows:

(1)—That a committee of state or district secretaries, of which the business manager of the National Association shall be chairman, be established and be composed of the secretaries of organized state or district associations. This committee shall meet quarterly, or at such other times as they may be called by their chairmen. The functions of this committee shall be to give consideration to the methods of conducting the affairs of the state association. They shall make recommendations to the Executive Committee through the business manager of the National Association as to its work and policies. The expenses of the members of this committee shall be met by their respective state and district associations.

(2)—That the Executive Committee be requested to immediately make effective the Advisory Committee provided for in Act 4, Sec. 5 of the constitution.

(3)—That a committee be appointed by the President of the National Association to consider the necessary revisions to the Constitution of the National Association and to make written notice of any proposed changes to the business manager of the association thirty (30) days previous to the next annual convention of the association.

(4)—That the Executive Committee of the association consider the advisability of moving their offices from Indianapolis to Chicago when, in their judgment, the necessary funds are available and the best interests of the association will be conserved thereby.

(5)—That the primary activity of the association for this coming year shall be an active campaign for members through the existing state and district associations and by the active encouragement of the organization of additional state and district associations.

(6)—That the association continue and increase its activities in its effort to secure equitable distribution of open-top cars to the industry from the existing supply and that the railroads be constantly urged to increase the supply of open-top cars for the use of this industry.

(7)—That a special committee be appointed to co-operate with other mineral aggregates associations to prevent further unresonable increases in the rates on mineral aggregates and secure and disseminate through the business manager's office and the secretary's committee, all information available concerning rate activities throughout the country.

(8)—That the National Association co-operate actively with all associations or organized bodies and government departments in extending and establishing the best practices as to the use of sand and gravel.

(9)—That it will be necessary in order to conduct the activities herein outlined that the association have available funds to the amount of $25,000 for the activities of the association and $5,000 in addition thereto for the activities of the committee on rates, making a total of $30,000 as the minimum amount required for the these activities.

(10)—That in order to secure the funds for the association to be obtained from assessment in a businesslike manner, that the payments during any year be based on the production in tons of the previous calendar year, and that these payments be made in four (4) equal parts, payable quarterly beginning March first, of each year.

(11)—That in order to secure the funds necessary to meet proposed budget of $30,000 above specified, that the activities outlined may be fully carried out to the benefit of all members, the rate of assessment based on the known production of members for 1919 should be and your committee herewith recommend:

That the minimum dues remain $25 per year;

That for the first 200,000 tons of production the rate of assessment be 2 mills per ton;

That for the second 200,000 tons of production the rate of assessment be 1¼ mills per ton;

That for the third 200,000 tons of production the rate of assessment be ¾ mills per ton;

That there be no assessment in excess of a production of 600,000, making the maximum assessment $800 per year.

That the promotion of Act 7, section 4, providing for a discount of 25 per cent from regularly organized state and district associations be not changed.

(12)—That your committee make the foregoing recommendations after careful and thoughtful consideration thereof and submit them, believing the same to be for the best interests of the association.

This report was unanimously adopted by the convention.

Officers Elected

The president elected to serve the ensuing year is V. O. Johnson, president of the Lincoln Sand and Gravel Co., Lincoln, Ill. Mr. Johnson came into national prominence in the sand and gravel industry at the time of the famous meeting of mineral aggregate producers in Washington in the summer of 1918. His brief showing the variety of uses and importance of sand and gravel (published in Rock Products, October 9, 1918) has become a classic, and was largely incorporated in the U. S. Geological Survey's report on sand and gravel for that year. Mr. Johnson is a lawyer in addition to his other accomplishments.

The two new members of the executive committee are Floyd Goodrich, of the Humbolt Sand and Gravel Co., Humbolt, Iowa, and A. W. Dann, of the Keystone Sand & Supply Co., Pittsburgh, Pa.

The retiring president, Harry Donnelly, of the Ohio Ballast Co., Cincinnati, Ohio, received a rising vote of thanks for his untiring work in building up the National Association during the last three years, in which it has become a real national organization. At luncheon on February 13 he was presented with a *completely equipped* leather traveling bag.

F. D. Coppock on Industrial Relations

President of the Largest Sand and Gravel Producing Organization Presents Ideas on Labor Policy to National Association Convention at Chicago—Personal Contact With Employees Counts for Most—Bonus vs. Profit-Sharing Systems

ONE OF THE MOST interesting discussions of the labor problems of the sand and gravel industry at the annual convention of the National Sand and Gravel Producers at Chicago, February 11, 12 and 13, was contributed by F. D. Coppock, president of the Greenville Gravel Co. Not only is this of much interest from the fact that Mr. Coppock is undoubtedly the largest employer of labor in this industry, but because his experience as a man among men has been such as to give him more than ordinary insight into the heart of the labor problem.

Mr. Coppock's paper was read by Howard B. Hoel, sales manager of the Greenville Gravel Co., in the absence of Mr. Coppock. The substance of the paper follows:

"The views which I express in this are the result of my convictions formed during the past seventeen years of constant contact with labor, and from different positions, as laborer, as foreman, superintendent, and finally as an employer.

"I believe that the great army of employers in the country, regardless of the number of men they employ, and the nature of labor to be performed will soon realize the necessity of greater industrial democracy. The absence of democratic ideas, the absence of personal consideration, the lack of contact and interest in the simple everyday affairs of the employed, the social distinction exacted by the employer, are labor's excuses for the lack of real interest in the affairs of the employer. It must be obvious therefore that the responsibility of the resulting dissatisfaction and unrest falls on the employer. It is natural that if we treat laborers as mere tools without any interest in their personal affairs, that they in turn will treat us as a machine, and without any personal interest in our affairs.

Labor and Investment Contrasted

"Did you ever stop to think how much we cater to bank officials in order to secure the use of $25,000 in money? At six per cent this money costs you the same per day as one laboring man. The laborer is just as essential to your operation as the money. This is one way to determine the value of labor.

"An organization employing twenty men to carry on its operation should consider the securing and retention of this labor fully as important as the borrowing of $500,000, because that is exactly what the men are worth, measured by the fact that we pay the men for their labor as much as we pay for the use of the money. Believe me, we would palaver and cater to every member of a banking organization from the janitor to the president that would lend us this amount of money for use in a plant requiring only twenty-men. We would be playing five-hundred with the cashier's family, golf with the president, and poker with the Board of Directors. We would

F. D. Coppock, President and General Manager of the Greenville Gravel Co.

go out of our way to extend pleasant greetings and be nice to them; we would drop in to see them personally on matters which might have been attended to by 'phone or letter—we would never think of sending a time-keeper or an office boy to see them. We don't need to borrow $500,000 to run one of our plants, but we do need the twenty men; yet, how much consideration do we give them, how often do we go out of our way to accommodate them or to please them?

Importance of Personal Contact

"I am convinced that if it would be possible for employers in the gravel game and other industries to realize the importance of personal contact with their men, that they would decide this to be the cheapest and most effective method of avoiding labor troubles. Why not take a day off now and then for the purpose of looking over the operation, and shake hands with these fellows, and why not make the common laborer feel that you have as much interest in him as you expect him to have in your business? Inasmuch as gravel operations do not require a large number of men, such a practice would require very little time; in fact, not as much as we devote to the cultivating of the banking bunch. How much more does one of these laborers prize a handshake with you and your solicitous inquiries as to his family than do those bankers! It is an easy matter to make a man yours for life by a little personal interest, and it is not necessary to renew a contract with him every ninety days as with the banker.

"I think that we should inaugurate and encourage the practice on the part of our management, supervision and foremanship to become more interested in labor, and to systematically and religiously cultivate a friendlier and closer relationship to it; and my advice to employers who have not the time to personally give attention to this important phase of operation, would be to employ someone whose business it would be to carry to his labor his good wishes, to investigate their personal likes and dislikes, and learn something regarding the families of the men, to attend to their needs and comforts and to make them, through this evidence of real personal interest, closer to his organization, and to feel that "big family" loyalty.

Selection of Foremen

"The choosing of a foreman or supervision is a very important thing. We should select men as nearly as possible who are considerate, reasonable and yet firm, men who reflect our ideas in dealing with labor. A common mistake is that of employing some husky double-fisted fellow as foreman, who feels that it is his duty to drive his men and to emphasize his position by being rough and dictatorial. The foreman, in dealing with labor, is your direct and constant representative, and we should tell him just how we want him to treat our men, and see to it that he carries out our policies.

"I am not a believer in Darwin's theories, and yet I am convinced that men have certain animal traits, especially the

more or less ignorant classes. I have experienced the same results in dealing with certain laboring men as I have with my Scotch collie.

A common saying is that the more you kick a dog, the more he likes you. This is not true, but it goes to show how much kicking the dog will stand for after you have made a friend of him and a home for him. Did you ever try kicking a strange dog? Don't do it, for if he is a worthwhile dog, has any backbone or get-up about him, he will bite you, or at least snarl and growl. I believe this same thing applies to men. We want a man with backbone, and admire those who stand up for their rights and have self-respect enough to at least want to be treated fair.

"As a usual thing our dogs, at times get a lot of attention—we pat them on the back, caress them, etc., and they seem to realize the condescension on our part and in return for this personal interest, they form a love and attachment for us that you can't kick out of them. The trouble is that we don't treat our laborer with the same expression of friendship and kindness that we do our canine friends. We growl and kick a lot at the laboring men, but we forget that they are strange dogs. This is just my way of emphasizing the value of personal contact, and I beg the laborer to pardon the comparison.

Looking After Physical Comforts of Men

"Other than to encourage this personal interest by our management and supervision, we are doing a few things which we have found advantageous. At one of our plants we have a small hotel, enough to accommodate sixteen men, equipped with comfortable beds, bath and toilet, lounging and reading room, with plenty of good reading matter. Have a family to manage and look after the rooms, board the men and run a commissary. We have tried to furnish every convenience to offset every excuse for their going to town. If we can keep these men from town, they are not so apt to be tempted by offers and bids from other employers. This bidding by employers has created a lot of discontent and turn-over in pay-rolls. At other plants we have trucks to haul the men to and from the work, charging the man an amount per trip to offset the upkeep of the machines. We have built houses at some of the plants which we rent to the most important of our men. We have encouraged and assisted others in the purchasing of their own property. We have never refused a man aid when he was sick, and have helped them to get all possible out of the Indemnity Insurance in case of accident.

Profit-Sharing

"I do not believe in profit-sharing with the laboring men in the commonly accepted interpretation of the term, inasmuch as in my opinion such a practice would have a tendency to give certain concerns a monopoly on labor because of patent rights, governmental protection, etc., which permit them to make out of their operation fabulous profits. Profits are not equal in all lines of business, even where the same number of men are employed. Profits are not the same at one gravel plant as at another, and I think the profit-sharing practice would tend to make labor in general discontented—some would be well paid while others would not. I do not think the profits earned by the company should be a measure, as I do think a man should be paid proportionately who exerts an earnest effort and manifests an interest regardless of profits earned by the concern employing him.

"We do this in the matter of profit-sharing: We employ plant managers on small salaries—small when you consider their position and ability—and then allow them a percent of the net earnings on their operations. We do this in order to encourage their interest in profit-making. Managers interested in salaries only are too apt to want ideal equipment and arrangements regardless of the practical application of such investments. We charge to the individual account of the manager the invoice price of all material condemned in order to prevent them from loading beyond the capacity of their plants. We emphasize the importance of properly-made materials and good service and prove to them wherein these are of more importance than immediate profits.

"Another thing which we do in order to encourage the personal interest of managers, salesmen and, in fact, all that are connected with our general office work, is to sell to them on easy terms of settlement, some common stock in our company. A considerable amount of our common stock is held by active members of our organization.

Bonus Systems

"As to the bonus plan. I think that a plan designed to allow a percent of the total amount paid an employe during the year, possibly at Christmas time, or at the end of the year, would be the means of encouraging labor to stay with you, and would assist materially in preventing turn-overs in labor, and would be looked upon by them as a gift and personal remembrance rather than an arbitrary sum to which they are entitled.

"I have suggested that our company put into effect January 1, 1920, the following plan: The allowing of five per cent of regular pay for all employees, regardless of the rate paid, who are with us for one year, this bonus to be increased ratably for five years so that at the end of the fifth year of continuous employment, the employee would be given twenty per cent per year on the total of his regular pay, as a bonus. In other words, the five-dollar man would get at the end of the first year about seventy-five dollars, at the end of the second year, one hundred and fifty dollars, and up to three hundred dollars at the end of the fifth year. Experienced men are worth much more than the inexperienced.

"This may be considered as an indirect way of sharing profits, and I am of the opinion that it will not only encourage personal interest, but it will anticipate and prevent demands for increases in wages, and assist in solving other problems which will in the end more than offset the cost to the company.

Value of Personal Contact

"One further thought in conclusion. Permit me to emphasize the value of personal contact between the employer and employee, the value of our handshake and good wishes, the value of courteous and yet firm treatment, and why, in my opinion, such a practice is the very highest type of profit-sharing. After all is said and done, profit, which represents a sum over and above the regular salaries, is worth only the comforts it can buy. One of the greatest comforts in the world to the laboring man is the personal interest in him of his employer. One of the most potent causes of great discontent and unrest among labor today is the great social gap between employer and employee, a condition for which the employer alone is to blame. The employer who holds himself aloof from his labor and fails to bind his labor to him with human interest, but emphasizes the social difference between them, makes his labor more dissatisfied and envious. This dissatisfaction and envy gradually grows into a feeling of hatred, and his whole object is to oppose rather than promote the success of the concern. Unfair unions, strikes, and labor troubles in general are the fruits of this envy. In a way the laborer is a victim of circumstances pretty much controlled by the employer and in my opinion he will be just what the employer makes of him.

"Never in the history of our country has the necessity been so apparent for the cultivation of a closer intimacy between employer and the employee. I believe that the most important duty of the employing class today and the most effective is to foster a friendlier and more personal relationship with labor."

Americanization at Cement Plants

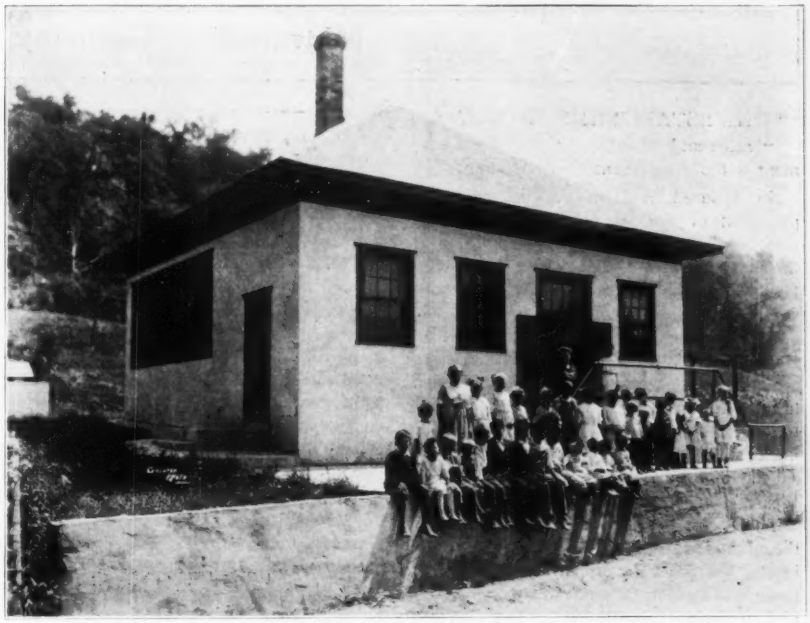
Cement Company Maintains a School for Foreign Employes' Children

UNUSUAL conditions have made it expedient for the Missouri Portland Cement Co. to build and maintain at company expense a school for the children of their foreign-born employes at the Kansas City plant. Cement City, Mo., the location of the plant, is a small community composed of the cement mill employes and the nearest public school is several miles distant.

A condition existed, such that the laborers' children were being reared in ignorance, and so the school was proposed. It was built last spring and opened in June. Much to the surprise of the management, the first day brought 32 unusually clean-faced and well-dressed children of Mexican, Indian and Negro parentage.

Now that the school is an assured success, the slogan is to acquire 100 per cent attendance, and so prizes for scholarship and attendance are offered.

H. L. Block, president, and D. N. Armstrong, general manager of the company, are greatly interested in the project and give the following reasons why it is to the company's advantage to do such work. First, it would be a calamity to see these children reared without some education; second, by taking an interest in the children, it makes the community desirable for married employes—thus the labor is more stable; third, in future years the boys with the advantage of a grade school education will make better workmen.



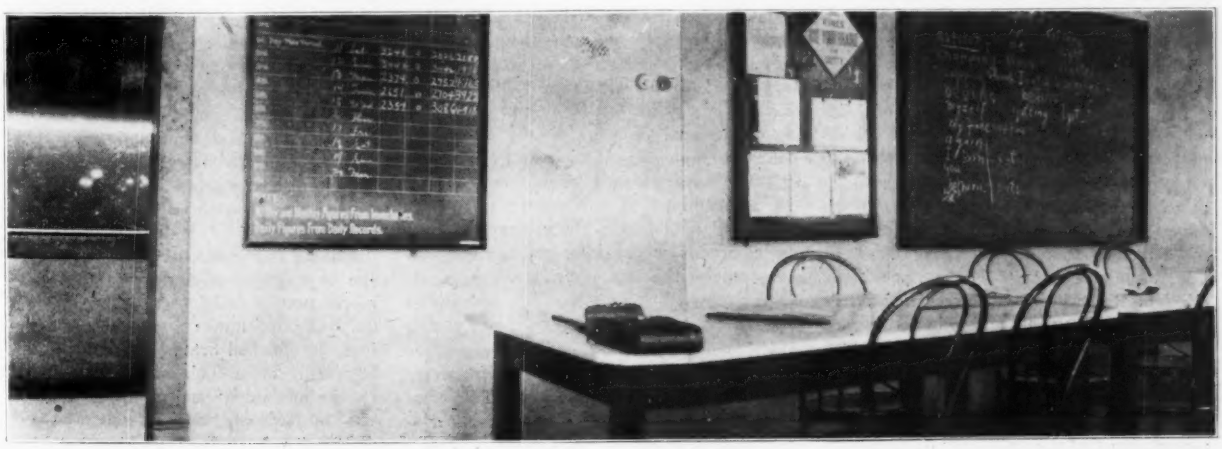
School maintained by Missouri Portland Cement Company

Conference, Lunch and School Room at Security

BELOW shows a practical method of promoting Americanization at the Security, Md., cement plant of the Security Cement & Lime Co., of Hagerstown, Md.

The room at the mill, shown in the accompanying view, is known as the "Foremen's Office." Adjacent to it the foremen have their lockers, washroom, etc. Most of the foremen meet here daily to eat their lunches together and incidentally talk over various things connected with their work. As a rule the superintendent of the plant eats with them and joins in the conference. In this room are also recording instruments showing the kiln performance, or efficiency.

On certain evenings of the week this room is used as a school room for instruction in the English language and Americanism for the benefit of the foreign-born employees. This work is in charge of the pastor of a local church, but the cement company, of course, gives him all possible help.



Foremen's lunch and conference room at plant of Security Cement & Lime Company

Example of Industrial Democracy

Success in Employes' Representation and Co-operation at the Plants of the Midvale Steel Company

By B. C. Forbes and E. P. Curtis

"THE ESTABLISHMENT OF WAGE rates and other conditions of employment without representation is tyranny."

So declared William B. Dickson, vice-president of the Midvale Steel and Ordnance and subsidiary companies, and one of the most prominent men in the steel industry. "The saying that taxation without representation is tyranny," he added, "epitomized the sentiment back of the American Revolution. Whether money is taken from a man by unjust taxation, or withheld from him by unfair wage, the principle remains the same. The right of collective bargaining by the workingman must be recognized as the legitimate outgrowth of American Ideals."

There could be no better illustration of the advance Industrial Democracy has made in the hearts of American employers than these words from a member of one of our gigantic industrial concerns. He holds that the only way out of the senseless struggle between capital and labor, is for employers to realize that the day of Industrial Democracy has dawned.

The great organization of which Mr. Dickson is an officer, a company employing more than 30,000 persons, has made notable strides towards industrial democratization, applied under the representation plan. While the plan has not yet reached perfection, it has developed some interesting situations. Mr. Dickson believes in complete industrial freedom, and he is one of the officials who initiated the company into this newest fraternity. He has worked from the shop up. He knows the side of the workman as well as the heart of employers. He can speak with wisdom on the subject. Hence, he was urged to tell of the ideals that prompted the adoption of the industrial representation plan and of the progress made.

Representation of the employes of Midvale was not the result of friction. It simply was the outgrowth of the ideals with which the company was formed and its progression through the sixty years of its experience. Almost all the officials are men of Carnegie training, including Wm. E. Corey, chairman; A. C. Dinkey, president; William B. Dickson, vice-president; A. A. Corey, vice-president, and others.

Here is the significant document which launched the Midvale towards industrial democracy:

"The board of directors and officers * * * recognizing that the prosperity of their company is inseparably bound up with the general welfare of their employes, propose, with the co-operation and assent of their employes, and for the mutual interest, to establish a plan of representation of employes, which will hereafter govern all relations between the companies and their employes.

"We recognize the right of wage-earners to bargain collectively with their employers, and we invite all employes to meet with the officers of their respective companies for the purpose of considering, and, if practicable, adopting a plan of representation by the employes, which shall be thoroughly democratic and entirely free from interference by the companies, or any official or agent thereof.

"It is hoped that every employe will respond to this invitation and meet with the company in the spirit of fair dealing and mutual helpfulness."

The representation plan compasses an inter-organization in every plant, each being divided into as many sections as may be decided upon by the division representatives. The basis is, roughly, one representative for each three hundred men. The books for the three months in advance of an election determine the average number of employes of each division. To do this accurately, the Plant Conference Committee has access to the time offices.

The elections are held annually, and there is as much excitement as is displayed by baseball fans or political devotees. There are nominations and the secret ballot. The employes are zealous in selecting workmen who can properly represent them. Neglect of work, habitual laziness, disloyalty of any sort, and dishonesty, fatally discredit a man. Only good, intelligent workers, loyal to the mutual interests of the companies and the employes, are picked.

When an elected representative ceases to be an employe of the company he also ceases to hold office; representatives must be comrades whose interests are one and the same with their associates.

The Plant Conference Committee is elected by the representatives from among their own number, with one representative for every 3,000 persons, and one for every excess of 1,500 in the divisions. This committee, together with the general superintendents, is known as the General Committee. This committee meets with the executive officers of the company.

Matters of interest on every topic vital to the happiness of the employes are taken up at stated times and at times of urgency.

But it is in the everyday life of the workman that the human interest of the representation plan is found. Often a man used to feel that the "boss" harbored a grudge against him and was "riding" him. Now an employe can present a grievance to his representative, without going over the head of a foreman. Failure of adjustment by the representative results in the representative carrying the matter before the Plant Conference Committee.

This insures a man's position as long as he is a good employe. He cannot be shoved off on account of a private grudge. It gives him security and happiness in his position in place of unrest and uncertainty. This, however, does not prevent the company from discharging employes; there are capital offenses for which men may forfeit their jobs.

Disloyalty to the United States is one of them. Any offense against the criminal law of the state; assault upon or attempt to injure another person; wanton destruction of property; refusal to obey a reasonable order by a superior officer; intoxication while on duty—these are other offenses for which a man loses his position with the Midvale. A discharged man can demand a full explanation of the cause and also has the right of appeal to the General Superintendent either in person or through his representative.

A warning and reprimand are given for carelessness, failure to report for duty regularly and inefficiency. Unless these become habitual they are not sufficient to make a man lose out. This gives a pride of shop that works for greater co-operation. Men work with the knowledge that they are observed by fellow citizen workmen, who are trying their utmost and expect the same of their comrades.

Once every three months there is a meeting of the elected representatives with officials to discuss matters of interest. This is found quite frequent enough to handle the situation.

Mr. Dickson has observed that the average of intelligence displayed by the men's representative is of high order. They do not compose flowery speeches nor burst forth in polished oratory, but they do have an intelligent outlook and a direct and effective method of approach. Men who assist in forming such democratic plans within a company are able to demonstrate the worthwhileness of the new democracy in industry.

"Why does a company upset its entire mode of administration, and inaugurate reforms of that sort, when everything was going smoothly and peacefully?" Mr. Dickson was asked.

"In the final analysis," he replied, "I believe that the workmen are the greatest gainers, although there is a mutual advantage. In recent years sentiment has been slowly but surely crystalizing around the idea of industrial democracy. We are in complete sympathy with this idea, which we hold to be identical with the ideals upon which this government was founded. It was to give full recognition to this sentiment that we founded the representation plan in our organization.

"In former years, when industrial plants were much smaller, it was possible for the owners and officers to maintain close personal relations with their workmen. This fostered that sympathy and understanding which almost invariably follow when men really get to know each other.

"Changing conditions, however, and the stupendous increase in the size of industrial units, have brought with them new problems, and among others, the great difficulty of maintaining this close elbow touch between the employer and employe."

While Mr. Dickson recognizes the right of labor to bargain collectively, he denounces the methods of irresponsible labor leaders who have prostituted labor and wrought unlimited harm for trivial ends. He believes that the solution is the participation of the workmen in the government of their conditions in the organization in which they co-operate.

"One may name as an important factor in social unrest the modern factory methods. I have in mind factories where, amid the ceaseless din, a man stands tending automatic machines pouring out an endless stream of products. How much pride of achievement can be associated with such a task, or in the case of workers in dust-laden, lung-destroying chemical or fertilizer factories?

"I do not wish to be understood as predicting that our plan is going to bring about the millennium. However, as President Wilson once said: 'I am more interested in the direction in which a man is facing than his rate of progress.' We are sure that we are at least traveling in the right direction."

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America's Greatest Promoter of Agricultural Limestone and Rock Phosphate

DR. CYRIL G. HOPKINS, head of the Illinois Agricultural Experiment Station, and the one man more than all others who was instrumental in bringing about the extensive use of ground limestone and rock phosphate on our Middle West soil, died recently in Europe. He was the originator of the "Illinois System of Agriculture—Lime, Phosphate and Legumes."

Because of his advocacy of rock phosphate instead of acid phosphate for ordinary Illinois soils, Dr. Hopkins incurred the enmity of the commercial fertilizer manufacturers and every effort that he made to introduce the use of ground rock phosphate was vigorously fought. Nevertheless the use of ground raw rock phosphate increased by leaps and bounds, not so much because Dr. Hopkins was its sponsor, as because his conclusions were incontestably established by every farmer's own experience. Through his efforts the farmers of Illinois are using today probably as much ground rock phosphate as the less enlightened farmers of all the other states put together. And he made Illinois the richest agricultural state in the Union.

Likewise Dr. Hopkins was something of a thorn in the side of the lime manufacturers because of his advocacy of ground limestone or limestone quarry screenings in place of burned or hydrated lime. Nevertheless he was one of the most powerful influences in America in the introduction of the use of lime and limestone on Middle West soils, and his writings have perhaps been more widely quoted and used to promote the sale of these commodities than those of any other man. He will go down in history as one of the best friends of the limestone quarry operator, whether a manufacturer of lime or not.

Fortunately for the agricultural lime industry, his work was so thorough and lasting in character that the impetus he gave to the development of the industry is bound to continue for all time.

In an appreciation of his life and work in the Chicago "Tribune" of Sunday, February 8, by Frank Ridgway it is said:

"He was worth millions of dollars to the state of Illinois. There was no second, no third, no fourth." Such was a tribute paid by a prominent citizen of Illinois to this man, the originator of the Illinois system of permanent agriculture.

Dr. Cyril G. Hopkins, called by many "the savior of our soil," died in the military hospital at Gibraltar while en route home from Greece, where he had spent a year making it possible for the people of that country to regain the fertility of their worn out soil. Memorial services paying tribute to his memory and to his work were held at the University of Illinois at Urbana. For almost twenty-five years he had been associated with the university.

Some one has said that every nation fails as the fertility of its soils become depleted. Dr. Hopkins had for years sounded the warning that if we do not improve our soils before we become too poor to do so, a like fate may befall our nation.

He put all his private energies and capital in recent years into the development of Poorland farm, which had been chosen from the poorest soil that could be found in southern Illinois. He spread limestone and some rock phosphate on the soil and began sowing clover quite successfully while his neighbors grew none. He gradually built up the producing power of this poor soil until in 1913 it produced an average yield of thirty-five bushels of wheat per acre. His neighbors no longer scoffed. They got busy hauling limestone to their farms.

Cement for Wisconsin Federal Aid Projects

THE accompanying table has been worked out from a set of proposals issued by the Wisconsin State Highway Commission and shows the price of bulk portland cement delivered on the job. The cement bids cover the entire season of 1920 for Federal Aid projects from practically all counties of the state.

Prices for bulk, paper and cloth sacked cement were submitted, but here only the prices of bulk cement are considered. Since the quotations are for material delivered on the job no comparison of prices is possible except the average price for the entire state might be considered in a general way.

PRICE OF BULK CEMENT DELIVERED ON THE JOB

	Bbls.	Highest Price	Lowest Price	Average Price
Marquette Cement Mfg. Co.	75,000	$2.23	$2.07	$2.14
Lehigh Portland Cement Co.	75,965	2.29	2.13	2.20
Atlas Portland Cement Co.	50,000	2.25	2.17	2.21
Universal Portland Cement Co.	175,000	2.13	1.91	2.04
Total	375,965	*$2.23	*$2.07	$2.15

*Average

Phosphate Reserves of Pacific Islands

ACCORDING TO A MEMORANDUM laid on the table of the New Zealand House of Representatives by the president of the Board of Agriculture, the reserves of phosphate of the Island of Nauru in the Pacific are sufficient to meet the demands of the world for 200 years. Information obtained from a reliable source, says the Board of Trade Journal, indicates that anything from 80,000,000 to 100,000,000 tons are available, and possibly more. The quality of the phosphate is said to be of the highest grade (85-86 per cent), and it is claimed that this island contains the largest known quantities of high-grade phosphate in the world. The present output of the island has been somewhat interfered with by the war, but the average yearly production is in the neighborhood of 150,000 tons.

There are several phosphate islands in the Pacific, these including Ocean Island, where the Pacific Phosphate Co. has the mining rights, this company also holding an interest in a French company which works the Makatea Island deposits; Christmas Island; Angaur Island, which, according to a German authority, contains 2,500,000 tons.

Annual Convention of the Sand Lime Brick Association

Meeting at Buffalo, N. Y., February 3 and 4 Shows Healthy Growth of the Industry and Prosperous Conditions

THE SIXTEENTH ANNUAL CONVENTION of the Sand-Lime Brick Association, held in Buffalo, N. Y., February 3 and 4, was one of the most successful meetings in the history of the organization. Six new producing companies were admitted to membership, and from both the papers delivered, and from general discussion and conversations, it would seem the industry was never in a healthier condition than now.

Canadian Progress

The progress of sand-lime brick in Toronto, Canada, was made evident by a paper by Robert Marshall, Canadian Inspection & Testing Laboratories, on "Some Experiences in Testing and Inspecting Sand-Lime Brick." These tests were made for the city of Toronto and were exceptionally favorable to sand-lime brick. The author brought out the point that the mortar joint was the weakest link in brick masonry construction and urged the sand-lime brick manufacturers to devote some of their promotional work to education in the proper use of their brick and to advocating better mortar.

Mr. Marshall also incidentally touched on the process of sand-lime brick manufacture. He said there was no question but that clay in the sand used decreased the crushing strength of the brick. He thought that the surface area method of proportioning concrete mixtures, about which so much has been said recently, could be applied in a similar manner to the proportioning of sand and lime in the manufacture of brick.

In the discussion of Mr. Marshall's paper, various manufacturers stated that it was entirely feasible to manufacture and supply ready-mixed mortars along with their brick. The necessity of education along these lines was readily admitted.

Time of Hardening

A paper by Warren E. Emley and Wm. M. Cleare, of the U. S. Bureau of Standards, on the "Time of Hardening of Sand-Lime Brick," was read by Mr. Cleare. Mr. Emley, who is just recovering from an attack of influenza, was unable to be present. This paper proved quite conclusively that excellent brick could be made by four hours' steaming, and that the exact pressure (from 120 to 150 lbs.) was not an important factor. Tests were made on brick steamed for 4-, 6-, 8-, 10- and 12-hour periods. These tests proved that there was nothing to be gained by steaming over 7 hours, and that a 6-hour steaming or curing gave about the most satisfactory brick.

It was shown that brick made of fine sand cure faster than those made of coarser material, and that sand with the lowest possible percentage of voids was the most desirable. The location of the brick in the treatment cylinder was not an important factor. The point was brought out that it is highly desirable to have a plant laboratory and make frequent tests on the run of the plant. In this manner each manufacturer could make the most of the special characteristics of his materials and adjust the duration of the curing period to meet those special requirements.

W. H. Crume

Not only will a shorter curing period than that now current practice save appreciably in fuel consumption, but it was shown that long steaming may actually result in decreased crushing strength in the brick. Other factors, such as the kind of sand used and the mixing process, are of more importance than the length of the steaming period. The only advantage to be gained by longer steaming was a bleaching out of the bricks, where a white brick was desired.

Hydration of Lime

J. Morley Zander, of the Saginaw Brick Co., Saginaw, Mich., described a device for mechanically hydrating lime which is used at his plant. The lump lime is unloaded from cars, crushed and elevated to a hydrator of the pug-mill type, mounted over the hydrate bins. An excess of water is added and the product discharged to bins and silos, where it is allowed to remain from 6 to 10 days before use, thus insuring a more thorough hydration. The lime used at this plant sometimes contains 8 to 10 per cent of magnesium oxide and it was found difficult to thoroughly hydrate it by other means than this bin or silo method. The device, Mr. Zander said, had a capacity of about 2 tons per hour.

All the manufacturers present seemed to agree that very little success had been attained in the use of commercial hydrate as supplied by lime manufacturers. No explanations of this were made.

Labor-Saving Equipment

W. H. Crume, of the Crume Brick Co., Dayton, Ohio, read a very interesting paper on 'Some New Devices Applied to the Manufacture of Sand-Lime Brick." The chief problem involved, as in every other industry at the present time, is the installation of equipment which will actually do away with hand labor.

The recent improvements at the Crume Brick Co. plant include the installation of a digging wagon loader and portable belt conveyor sections to remove the sand from the bank and convey it to a permanent belt conveyor to the plant. The sand then goes through a scalping screen and a jaw crusher.

The mixing at present is done by the wet-pan process. In an attempt to find a pulverizer to grind up the coarse sand and gravel, Mr. Crume believes he has hit upon a machine which will do both the grinding and mixing. This is a Marathon mill, which is a rod-mill with certain patented features which permit the inclination of its axis to be changed, the object being to thus vary the fineness to which the material is being ground.

Mr. Crume has also introduced labor-saving by use of motor trucks with detachable bodies to handle his brick from the steam cylinders to storage and to railway cars. His plant has recently

been completely equipped with individual drive electric motors, which is also expected to mean a saving in power-plant operation.

Some brick made at Mr. Crume's plant, which served as a pavement in the plant yard and have been exposed to the weather and under water off and on for 10 years were recently tested by the U. S. Bureau of Standards, and were found to have lost very little of their original compressive strength, as shown by tests of similar brick at the time these were made.

Standard Specifications

A discussion of tests and standard specifications for sand-lime brick was led by W. K. Squier, of the Paragon Plaster Co., Syracuse, N. Y. Mr. Squier went into the past history of the Association in its attempt to get fair treatment in the matter of tests and specifications and opposed the acceptance of the standards proposed by Committee C-3 of the American Society for Testing Materials. He believed the Sand-Lime Brick Association should have a standard specification of its own.

J. L. Jackson, of the Jackson-Church Co., Saginaw, Mich., then submitted the proposed specifications of the American Society for Testing Materials and urged their adoption. After considerable discussion, these specifications were unanimously approved.

Tests of Brick Piers

In a paper on "How Brick Piers Fail," by Warren E. Emley and Wm. M. Cleare, the whole theory of stresses in brick masonry was discussed and an attempt was made to develop a relation between the tensile strength of a brick and the compressive strength of a pier made of similar brick.

Various characteristics of brick, such as laitance, porosity, or pores in the surface of the brick, whether laid wet or dry, were also discussed in their relation to the strength of brick piers. Bricks with surface pores in which the pores or holes were of larger diameter under the skin than on the surface were most desirable, and Mr. Cleare said, were possible of attainment in the manufacture of sand-lime brick. Bricks with parallel surfaces were highly desirable and in this respect sand-lime brick had a big advantage over the ordinary clay brick, while in tensile strength sand-lime brick were as good as the ordinary clay brick.

Brick Inspector's Experience

C. H. Carmichael, of the American Brick Co., Boston, Mass., presented a paper on "Some Experiences in Brick Making," which contained some very interesting biography. After 15 or 16 years' experience in sand-lime brick manufacture, Mr. Carmichael served his country during the war as an officer of the quartermaster's department in the inspection of brick purchased for some of the great warehouse construction projects in the East.

The opportunity was thus afforded to compare the two systems of brick making and their respective merits and advantages and disadvantages. The result was that when the war was over Mr. Carmichael returned to the sand-lime brick business with unbounded faith in its advantage over the clay-brick industry. He was largely instrumental in organizing the American Brick Co., with offices in Boston, Mass., and a sand-lime brick plant at Medfield, Mass.

Old Officers Re-elected

All the 1919 officers were re-elected as follows: President, W. H. Crume, Crume Brick Co., Dayton, Ohio; vice-president, W. D. MacFarlane, Winnipeg Brick Co., Winnipeg, Canada; secretary, R. C. Kiser, Crume Brick Co., Dayton, Ohio; treasurer, John L. Jackson, Saginaw, Mich. The executive committee comprises: H. W. Terry, Toronto, Ont.; I. G. Toepfer, Milwaukee, Wis.; Homer E. Knapp, Rochester, N. Y.; A. S. Bacon, Albany, Ga.; and S. O. Golio, Waltonville, Pa.

Registration

The registration at the meeting was as follows:

Jackson-Church Company, Saginaw, Mich.—J. L. Jackson, J. W. Van Brunt.
The Grande Brick Co., Grand Rapids, Mich.—H. O. Joseph.
The American Building Products Co., Chicago, Ill.—F. C. Stevens, Barney Laben.
Eastern Potash Corporation, New York City—A. Schilling.
North Indiana Brick Co., Michigan City, Ind.—Wm. F. C. Dall.
Saginaw Brick Co., Saginaw, Mich.—J. M. Zander, J. M. Zander, Jr.
The Acme Brick Co., Milwaukee, Wis.—I. G. Toepfer.
Buffalo Sandstone Brick Co., Buffalo, N. Y.—Frank Hossenlopp, Lawr. Hossenlopp.
Crume Brick Co., Dayton, Ohio—W. H. Crume, R. C. Kiser.
Harbour Brick Co., Toronto, Ont.—H. W. Terry.
Plant City Composite Brick Co., Plant City, Fla.—W. J. Carmichael.
American Clay Machinery Co., Willoughby, Ohio—W. J. Carmichael, F. N. Shankland.
Hummelstown Brownstone Co., Waltonville, Pa.—A. K. Walton, A. G. Walton, S. O. Goho.
Paragon Plaster Co., Syracuse, N. Y.—W. K. Squier.
Winnipeg Brick Co., Winnipeg, Canada—W. D. MacFarlane.
The Sebewaing Sandstone Brick Co., Sebewaing, Mich.—J. S. Palmer.
West Lake Brick & Products Co., West Lake, Ont.—L. V. Stevens, R. A. Lillibridge.
Rochester Composite Brick Co., Rochester, N. Y.—Homer E. Knapp.
Portage Silica Products Co., Portage, Wis.—J. N. Thouvenell.
American Brick Co., Boston, Mass.—C. H. Carmichael.
U. S. Bureau of Standards, Washington, D. C.—Wm. M. Cleare.
Canadian Inspection & Testing Laboratories, Toronto, Ont.—Robert Marshall.
"Rock Products," Chicago, Ill.—N. C. Rockwood.

Box Car Embargo Hinders Lime and Cement Shipment

TO FACILITATE the movement of grain and relieve the congested condition of elevators throughout the Middle West the Railroad Administration has placed a ten-day embargo on the shipment of any form of freight that cannot be transported in refrigerator, live stock, or open cars, with the exception of grain, print paper, wood pulp, and sugar. The railroads in Illinois and every state from the Mississippi to Colorado and from Canada to the Mexican border are affected by the ruling.

The orders, as issued by Director General Hines, turn all available box car equipment into the grain transportation service to the exclusion of practically all other traffic for a ten-day period which began Feb. 8.

Action Is Explained

Mr. Hines issued the following statement explaining his action:

"Because of the imperative necessity of providing greater movement of bulk grain, the grain loading railroads serving the grain producing states have been given instructions to give preference and priority to the furnishing of box cars for bulk grain loading from Feb. 8 to Feb 18 inclusive, after providing for the loading of less than carload merchandise, print paper, wood pulp and sugar.

"The railroads also have been instructed to secure the full co-operation of grain dealers, distributors, farmers, commercial organizations, and other commercial interests in order that this special movement may be as successful as possible."

Railroads affected serve Illinois, Minnesota, Montana, Missouri, Iowa, North Dakota, South Dakota, Nebraska, Oklahoma, Colorado, Wisconsin, Kansas, Arkansas, Texas and New Mexico.

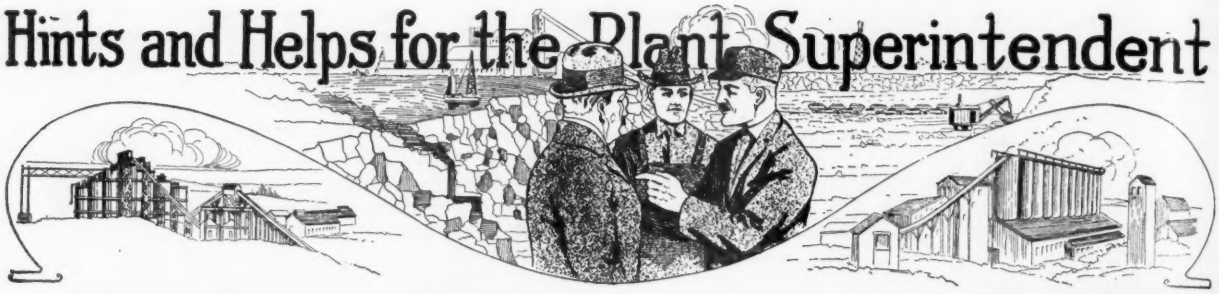
Appropriation for Development of Road Building and Potash Industry

WASHINGTON, D. C.—Several funds of interest to readers of ROCK PRODUCTS are included in the thirty million dollar appropriation bill for the Department of Agriculture, which is now before Congress.

Total appropriations for the Bureau of Public Roads amount to $490,620. Of this, $102,300 is to be used for investigations of the best methods of road making and the best kinds of road-making materials, and for furnishing expert advice on road building and maintenance. The sum of $77,020 is provided for investigations of the chemical and physical character of road materials, for conducting laboratory and field experiments, and for studies and investigations in road design.

Exploration for and development of domestic sources of potash will be considerably advanced by the appropriations to be made for the Bureau of Soils. A fund of $36,840 is to be provided to determine possible sources of supply of potash, nitrates and other natural fertilizers; and $192,900 to determine the best method of obtaining potash on a commercial scale.

Hints and Helps for the Plant Superintendent



Quarry Car Dumper

THE GREAT WESTERN PORTLAND CEMENT CO., Mildred, Kans., uses the method here illustrated to dump quarry cars at the crushing plant. The cars are drawn up an incline over the crusher and run on to a short section of track so pivoted as to tip automatically if loaded past the center. A counter weight attached to the rear end holds the tipple in position while unloaded.

As the car runs on to the dumper, a hand lever is operated to raise two hooks under the car, to catch the axle of the car; thus the car is held firmly to the track tipple.

As the weight of the car passes the pivots the counter weight holding the tipple up is overbalanced and the car tilts headforemost, and bars projecting at the sides from the end gate strike rail sections at floor level, and the gate is raised. When the stone has run out, the car is light enough so that the track will right itself.

By pushing the car back slightly the hooks may be released from the car axle and the car is pushed on over the dumper to the return track.

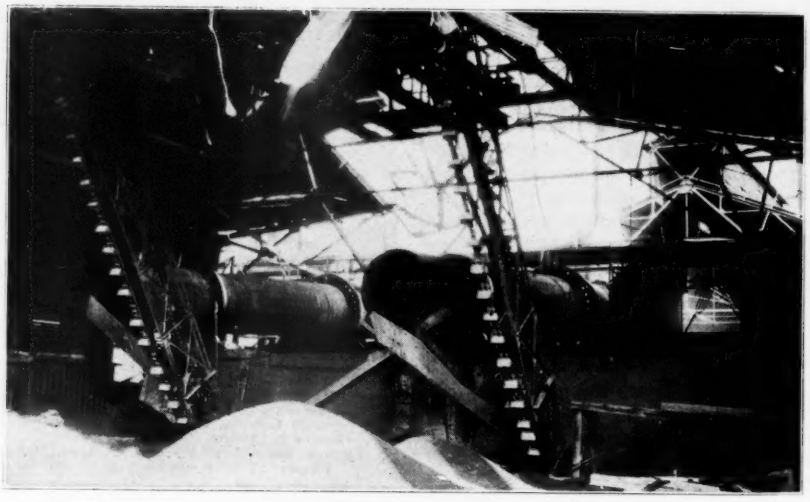
Quarry cars end-dumped by tilting track sections

Cooling and Storing Clinker

THE Continental Portland Cement Co., whose works are at Continental, Mo., uses the method herewith illustrated in cooling and handling clinker. The hot clinker from the kiln room is conveyed across to the coolers and clinker storage, which are all in one department.

The cool clinker from three coolers is directed to two bucket elevators and is elevated over the cement storage. From this point it may either be chuted to the storage pile on the floor below or to the finishing mills. A cross conveyor is provided so that the material may be returned to the finishing mill. When the clinker is being put into the storage an adjustable arrangement provides so that the clinker may be distributed to the various parts of the storage.

Material put into the storage is reclaimed by being scraped down to these same elevators by an electric hoist driven scraper. It is stated that this arrangement gives the maximum amount of flexibility, for the plant can either finish, fresh clinker, a combination of fresh and stored clinker or entirely stored clinker.



Discharge end of cement coolers and elevators to clinker storage

Loading Leaky Open Top Cars

AS EVERY sand and gravel and crushed-stone operator knows, the use of hay or straw for plugging up the cracks and gaps in gondola and other types of open-top cars is very objectionable from the point of view of the user of the material. In these days, when cars are received in such rotten condition, the trouble is aggravated.

One well-known Indiana operator uses strips of cardboard, which he buys locally as a waste product, and finds these an excellent substitute for straw, as the strips are much easier to pick out of the sand and gravel after it is unloaded than the straw is.

The experience of other plant operators, both as to costs and different practices in overcoming this difficulty, is solicited. All contributions will be paid for at space rates. Let's hear how you have solved the problem.

Drag Lines for Quarry Stripping

THE ROWAN COUNTY FREESTONE CO., at Farmers, Ky., is stripping an overburden of sandy clay, soapstone, shale and loose rock, 12 to 18 feet thick, by means of drag lines.

The scraper buckets proper consist of ⅜-in. steel pans with fixed and sloping year ends, and are shod with ½-in. and 2-in. shoes to take the wear. Other details of this system consist of a dumping mast, a hoisting engine and a sufficient length of wire rope to connect the scrapers, mast and engine, as shown in the accompanying illustrations. A pair of buckets are operated from each mast.

The rope is endless and as the loaded bucket moves toward the mast, the empty returns for another load. The loading crew is composed of five men. The transportation system averages forty loads per hour. Various methods are used for different materials encountered by the drag line. When soapstone is to be removed, it is first blasted and grab hooks are substituted in the place of the scraper buckets.

The stripping width at any one position of the mast is 80 ft. When this area is stripped, all of the system, except the buckets proper, can be put to quarry use, so there is practically no idle equipment in this plant.

Proportioning Raw Cement Material by Volume

A LARGE CEMENT manufacturer in the Central West uses the following method of proportioning limestone and shale at the raw material bins. The mix is controlled by the wet process, and so the raw materials are proportioned by volume instead of weight.

The raw stone and shale are sent to large concrete hopper bottomed bins after they pass the preliminary crushers. Underneath these bins there is a track and passageway, so that a car may run under the chutes and be loaded.

The car used for this process is a small steel electric - storage - battery - driven car. The box bed has a partition which can be moved to reproportion the amounts of shale and limestone. A graduated scale along the edge of the car bed enables the chemist to figure out how much the partition should be moved for a corresponding change in the raw material proportion.

When loaded, the operator runs the car out to a dumping hopper and its contents are side-dumped into a pit which feeds to an elevator for delivery to the wet kominuters.

Loaded bucket approaching the dumping mast

Loaded bucket in foreground, unloaded bucket in background

Unloading at the dumping mast

Lime in the Soap Industry

Occupies Permanent Place in Treatment of Fats and Greases—Only High Calcium Lime Can Be Used in Most Processes

By E. Scherubel
Chemist, Swift & Company,
Union Stock Yards,
Chicago, Ill.

THE USE OF LIME in the soap industry is intimately connected with the manufacture of caustic soda, which dates back to 1845, although causticizing by means of lime did not come into general use until 1858. The basic operation in making soap is termed saponification. By this is meant, in general terms, the process of decomposing a fat into its constituents, fatty acids and glycerine, through the agency of a caustic alkali, high pressure steam or special reagents. Water is always necessary for the reaction; and when a caustic alkali is used, and this is practically always the case in making soap, the base or metal of the alkali immediately unites with the fatty acids of the fat and the product formed is soap. Large scale soap operations were not possible until caustic soda became a commercial article.

Manufacture of Caustic Soda

The starting point in the manufacture of caustic soda is sodium carbonate, which is also an alkali, and which is made by melting together, in a suitable furnace, sodium sulphate, coal or coke, and limestone. The sodium sulphate is reduced by the carbon to sodium sulphide which reacts with the limestone to form sodium carbonate. This is a soluble product and is dissolved out and filtered from the insoluble residue. Very often in practice an excess of limestone and coal is used, so that free caustic lime is formed, which reacts with the sodium carbonate to form caustic soda. A pure limestone is necessary for this purpose and the lime should average close to 90% calcium oxide and be low in magnesia.

The causticizing of sodium carbonate with lime for the production of caustic soda is carried out as follows: A solution of sodium carbonate is boiled and agitated with air and the lime is introduced by means of an iron cage which is filled with active lime and suspended in the solution. The air agitation serves to oxidize impurities of iron and sulphur compounds in the lime and render them insoluble. Not more than 92% of the carbonate is ordinarily causticized, although methods which involve pressure give higher yields.

Quality of Lime Required

The lime used in this operation should be made from limestone of good quality and not clayey, since otherwise the caustic liquor does not settle properly. Lime of such quality will analyze approximately as follows: Calcium oxide 92%, magnesium oxide 0.08%, calcium carbonate 1.71%, insoluble in hydrochloric acid 0.38%, acid soluble silicates 1.55%, calcium sulphate 0.22%, iron oxide 0.15%, manganese oxide 0.25%, iron sulphide 0.10%, moisture 2.87%, magnesium or dolomite limestone do not make satisfactory lime for this purpose, but a lime analyzing much lower in active lime has been used with satisfactory results. Such lime analyzes about as follows: Calcium oxide 87%, calcium carbonate 6.24%, calcium sulphate 0.69%, calcium silicate 2.46%, magnesium oxide 0.27%, iron oxide 0.11%, iron sulphide 0.10%, manganese oxide 0.04%, silica and clay 1.91%, moisture 0.95%. Compounds of iron, sulphur, and magnesium should be low while the active lime content can vary from 80 to 90%.

Editor's Note

This article was prepared especiallly for ROCK PRODUCTS, as one of the series on the uses of lime in the chemical industries. Dr. Scherubel, the author, is one of foremost authorities on the soap and glycerine industries.

Saponification by Caustic Lime

The saponification of fats by means of caustic lime was first attempted by Milly, but was not developed and brought out into workable form until later when the efforts of a German named Krebitz were successful, and this process is used at the present time to some extent. The object of this process was to obtain fatty acids for the candle industry. The operation is carried out by mixing the oils and fats with about 30 per cent of water and boiling with from 12 to 14% of carefully selected lime of high purity and low in magnesia. When the reaction is complete the mixture is allowed to stand for a time, when the insoluble lime soap sets up hard in the vessel and must be dug out and broken up.

In order to obtain the fatty acids the lime soap is treated with sulphuric acid, which liberates the fatty acids and removes the lime as insoluble calcium sulphate. These fatty acids can then be washed and pressed. To make the commercial sodium soap from lime soap it is necessary to grind the latter and then to wash this powder several times in order to remove the glycerine which was set free when the fatty acids combined with the calcium of the lime.

The glycerine free lime soap is next dried by suction after which it is introduced in small amounts into a kettle containing a boiling solution of sodium carbonate. This precipitates the lime as calcium carbonate and forms the soluble sodium soap which goes into solution and must be salted or grained out by the addition of salt in the regular method of procedure in soap practice. The lime sludge must also be removed and freed from soap by washing.

The process is cumbersome and requires time and considerable manipulation, and it is therefore not now employed to any extent. During the war, however, one large concern installed this process on account of the better yield of glycerine which it is said is recoverable from fats treated in this manner. When glycerine is high in price, this might pay. There is, however, another drawback and this results from the fact that the amount of lime used must be greater than the theoretical quantity of 9.2%, the excess of course being wasted.

Improvements in Lime Process

More recent developments have shown that when lime and fats are subjected to steam pressure the amount of lime necessary for decomposing the fat into fatty acids could be greatly reduced and brought down to as little as one per cent if the pressure were correspondingly raised. This fact is of value to the candle industry as the use of large quantities of sulphuric acid for decomposing the lime soap can be obviated as well as the cost of handling the lime sludge thus formed. In the soap industry this fact is also of importance, as the development of the distillation industry is based upon it.

To carry out this process of saponification under pressure, vessels known as autoclaves are necessary. These are

cylindrical in shape and preferably of copper, although steel may be used. Into these the fats are charged, mixed with one-third their weight of water, and then 3% of active lime, in the form of a one to three milk of lime mixture is added and the mass subjected to a pressure of 120 lbs. for 8 or 10 hours. In this process the lime acts as a catalyzer or accelerator, and of course enters into combination with the fat to form lime soap, which is soluble in the fat.

This hydrolysis or splitting of the fat into its fatty acids reaches as high a figure as 98% of the total fatty acids in the case of high-grade fats. If magnesia is used in place of lime, the saponification is not so rapid under the same conditions, and to get the same result the time and the pressure must be increased. Hence it follows that a high magnesia content in the lime is a detriment. When the reaction is complete, the water which contains the glycerine is drawn off and the fatty acids boiled with sulphuric acid to decompose the lime soap and remove the lime as calcium sulphate.

Fatty acids prepared in this manner from high-grade fats can be pressed and used without further treatment in the candle industry; but fatty acids from low-grade fats such as are used in the manufacture of certain soaps must be subjected to another operation. This operation is distillation; and all large soap works of the present time have distillation plants. In this process the dark fatty acids obtained by autoclaving are distilled under vacuum with superheated steam when a much lighter-colored product is obtained, and by double distilling a white product can be obtained. The lime saponification method is not used in all distillation plants on account of cost of installation and maintenance as well as cost of removing the lime sludge.

Lime for Recovering Glycerine

Another use for lime is found in treating the glycerine water resulting from this saponification as well as the lyes produced in a soap factory from the regular method of making soap by boiling the fats with a caustic soda solution. These waters and lyes contain dissolved soap and soluble impurities which it is necessary to remove before the solution can be concentrated by evaporation for the recovery of glycerine. The addition of milk of lime precipitates these impurities as insoluble compounds, which can be filtered out. As only the active lime takes part in these reactions the quality of this product should be good.

Preparation and Use of Lime Soaps

Lime soaps as such are used in the industries to some extent and they are prepared in one of two ways. Perhaps the most general method is that known as double decomposition. This consists in dissolving a sodium soap in water and then precipitating the insoluble lime soap by adding milk of lime or a soluble lime salt, such as calcium chloride. The lime soap is filtered off and dried. It contains between 9 and 9.5% of calcium. The second method consists in heating the fat or the free fatty acids, obtained by any saponification process, with active lime in the form of milk of lime and then washing and drying the resulting soap.

The chief uses of lime soaps are in the manufacture of solid lubricants and the waterproofing of cements and textiles. They are soluble in fats and in many of the fat solvents. As a constituent of lubricants they are valuable in locomotive greases and in machine greases. In the cement industry the chief lime soap used is made from stearic acid, which is a high melting point fatty acid found in all common animal fats. Only a small percentage of this soap is necessary to render cement impervious to water.

In general the role of lime in the soap industry has made possible the development of this industry chiefly through its importance in connection with the manufacture of caustic soda; and while there are now other methods in use, it does not look as though lime would ever be displaced. With regard to its use in the treatment of fats, newer methods have partly replaced those employing lime, although the latter is still important and will remain so. The one outstanding feature concerning lime in all branches of these related industries is that high quality lime low in magnesia content is necessary.

Complaint on Rates on Cement Into New England

AN ATTACK on the relativity of rates on cement from the Lehigh and the Hudson districts to New England destinations has been opened by the Atlas Portland Cement Company, which seeks to bring about an adjustment, which, in its opinion, its location on the western edge of New England warrants. Nine formal complaints have been prepared and some filed against each of the delivering roads in New England, accusing them of unduly preferring the cement originating in the Pennsylvania district and unduly burdening the cement from the Hudson district.

The first of the complaints, No. 11110, Atlas Portland Cement Company, was placed on the files of the Interstate Commerce Commission January 7. In it Frank Lyon, the attorney, and Walter Young, the general traffic manager, for the complaining company, set up comparisons of rates on cement from the two districts. Then they show the rates on anthracite coal from the two districts. The rates on cement from Lehigh to New England are lower than the rates on anthracite coal, while on cement from Hudson the rates are higher than on coal. The rates on hard coal from the Lehigh district to New England destinations are shown in the exhibit attached to the complaint mentioned to be from sixty cents to $1.40 per ton higher than the rates on cement.

From Hudson the rates on cement are from 80 cents to $1.20 per ton higher than on coal. Other showings are that the rates on cement from the Lehigh district are lower than rates on stone, brick, clay, sand, from Spring Mill, Pa., asphalt, slag, lime and zinc ashes, all of which move in open-top cars, while cement must be carried in water tight box cars. The exhibits emphasize the fact that the disparity, in favor of cement from the Lehigh district, between cement and anthracite coal is against a commodity that moves in ten times as great volume, in any kind of equipment that will contain it and in trainloads, while the cement moves in carloads in equipment that must be in first-class weather-proof condition; that the preference for cement also causes an undue burden to be placed on the other low grade commodities mentioned.

The prayer is for just, reasonable, and non-discriminatory rates for the future, without suggesting whether the rates on cement from Lehigh should be increased or the rates on coal should be reduced. The reasonableness of rates on anthracite coal to New England has never been under direct scrutiny by the Interstate Commerce Commission. In its big anthracite coal rate inquiry, it directed attention specifically only to rates to tidewater and to the Niagara frontier.—From the "Traffic World."

Potash Deposit in France

THE POTASH monopoly of the world will be held by France instead of Germany in the future because of the cession of Alsace-Lorraine to France. The potash deposits extend sixteen kilometres (9.94 miles) to the north of Mulhouse, over a surface of more than 180 square kilometres (69.2 square miles). They are unusually rich in potash salts, much richer in fact than the beds in the interior of Germany. They are, moreover, easier to exploit. Their thickness ranges from 3.7 to 5.4 metres (12.1 to 17.7 feet). The thickness of the smaller beds in the upper layers varies from 0.8 to 1.5 metres (2.6 feet to 4.9 feet).

The first workings were begun in 1909; in 1913 there were twelve in operation. In a period of only three years the production rose from 42,420 to 287,000 metric tons, so that the production of potash in Alsace in 1913 was already one-fifth of the entire German output.

Production Purchase and Use of Mid-West Road Materials

Mississippi Valley Highway Officials and Contractors Do Not Favor Use of Portable Plants—Present State Practices Pertaining to Mineral Aggregates

THE ASSOCIATION OF MISSISSIPPI VALLEY STATE HIGHWAY DEPARTMENTS held a joint conference on concrete road construction at the Hotel La Salle, Chicago, Ill., on February 3 and 4. The meeting developed into quite an interesting discussion of road-building materials, which, although presented from the viewpoint of highway engineers and contractors, is of considerable importance to the material men's interests. The conference was well attended by highway officials from nine states and contractors from eight states.

On the morning of February 4 the meeting took the form of an open discussion, with some 200 men interested in road construction present. F. F. Rogers, of the Michigan highway department, was the presiding officer.

Who Shall Purchase the Material?

In the consideration of whether the state highway departments or the contractors should purchase the material used for road construction the practices of the different states were discussed. The state of Illinois purchases the cement for all of its road construction and according to the testimony of the highway officials and a number of the contractors this policy has met with considerable success. At present this state is considering the advisability of buying all the mineral aggregates as well.

In states where the highway departments have purchased other materials than cement, the plan has not met with entire success. The contractors oppose this scheme because it would, in time of material shortage, put the contractor in a position where he would have to stand and watch his reserve material being used up with only a protest to the state officials. As it now is, the contractor may guard his own interests by hurrying around at such times and getting the material from any available source, if even at an increased price, thus insuring continued operation even at a greater expense. The contractors took the position that the only way that the state could take the purchase of material out of their hands would be by assuring contractors compensation for lost time due to its responsibility in case no material was available.

In support of the state's supplying all the material, the engineers cited the success of the state of Illinois in purchasing cement at a very low figure. In view of the immense road program under way at present, it is the opinion of some that there is a necessity for a centralized authority for purchase and distribution of all road-building materials. Such an arrangement would enable large single purchases by the highway departments. The material to be supplied could then be distributed to the various producing plants so as to guarantee each the production of a certain minimum amount per day. Since the department would know the capacities of the plants of the state they would be able to proportion the material supply to contractors so that the producers could care for it to the contractors' advantage. Large purchases, it is believed, would enable material to be purchased at a lower price.

A central point for distributing material to contractors would eliminate the cross-hauling of material—as far as possible the material of each plant would be consumed in the district surrounding the plant. The state could institute a policy of buying and storing material during the early months of the spring when there is an abundance of cars and when the producers are normally operating at low capacity.

This method would also be valuable to the small contractor who does not have the capital to buy large quantities of material. A number of the states represented at the meeting are even now considering the proposition of supplying all of the materials used in road construction.

In order that contractors may purchase material in advance for road construction the States of Michigan, Illinois, Wisconsin, Kansas, Iowa and Minnesota have made provisions in their road laws which allow for payment of material upon its being delivered to the job. The States of Nebraska and Ohio pay for material in place. Further, all the states represented except Indiana and Ohio guarantee the contractor against increase in freight rates. In some cases this guarantee also reads that in event of a rate decrease the state will be benefited thereby.

The State of Wisconsin has incorporated in contracts being let at present the requirement that a certain per cent of material to be used on jobs to be completed this year must be on the road site before May 1. The state highway officials recognize the fact that during the early spring months there is a surplus of open top cars which are available for the movement of mineral aggregate. Such action will also lengthen the producer's operating season.

Portable Plants Are Opposed

In the discussion of producing material locally by portable plants it was gratifyingly evident that neither the highway engineers nor the contractors are anxious to produce material by this method where there is any obtainable from commercial producers. Clifford Older, chief engineer of the Illinois state highway department, stated that in Illinois the development of local sources of supply was an impossible question due to the location of the aggregate deposits. Illinois aggregate is pretty well concentrated in a number of places, each one of which is well developed by commercial producers. In several instances in the southern portion of the state, where there are but few commercial plants, several workable ledges of stone have been discovered, but nothing by way of their development has been started.

F. F. Rodgers of Michigan stated that in his state the unusual conditions make necessary the development of some local deposits to save high freight rates. It seems that there is a rather universal distribution of material over Michigan, and that a few local plants have been operated. The Michigan state highway department is now opening a crushed stone plant of its own.

Minnesota's experience with side-of-the-road plants has been rather disastrous. About 50 attempts have been made there with less than 10 actual successes. The other 40 operations were abandoned because it was impossible to produce material at a reasonable cost. In a few instances the small sized aggregates have been produced successfully, but the local plants do not seem to be able to handle larger sizes.

A. R. Hirst of the Wisconsin state

highway department feels that the production of material is no more a job for the state than contracting would be. He does feel, however, that it is a legitimate field of activity for the experienced commercial plant operator, and takes the stand that it would be an excellent investment for commercial producers to enter the business of supplying material locally in such localities as are excluded by freight rates from the market of commercial plants.

The contractors' argument against portable plants took the following form. In the first place, contractors feel that their legitimate duties involve enough troubles without branching out into the material-supply business. Men having experience in such projects state that it costs at least $1,000 to open up a deposit and to get ready for operation. Even then the plant is not as satisfactory as it should be. There is considerable difficulty in getting clean and accurate separation. There seems to be quite a problem in keeping labor at these plants. Different methods of paying the men have been tried, but all with no more than mediocre success.

After the material is prepared and separated there is in almost all cases an excess of certain sizes which are washed and screened, but in this particular case are of no value. The handling of this material only increases the unit cost of producing the required or usable sizes. In the case of a crushed-stone plant, the screenings are almost always a dead loss. In the case of the commercial producer different requirements for material coupled with storage facilities enable the different grades to be marketed.

A number of other subjects pertaining to the theory of road construction and preparation of the subgrade which would not be of great interest to material men were also discussed.

Rate Decision on Indiana Sand and Gravel Moving to Chicago

A READJUSTMENT of the rates on sand and gravel from Kickapoo, Ind., and Ginger Hill, Ind., to Chicago is to be made by the Director-General and the railroads on or before April 20, in accordance with the terms laid down by the Interstate Commerce Commission in No. 10528, Kickapoo Sand & Gravel Co. vs. Atchison, Topeka & Santa Fe et al., opinion No. 5982, 55 I. C. C. 657-60. The rates from Kickapoo are not to exceed those from Ginger Hill nor are they to be more than five cents a ton higher than the rates on the same commodities from Algonquin and other inner-zone points into Chicago. Reparation is also to be made to the complaining company for differences in rates greater than those authorized for continuance after April 20. Rates for joint and belt line deliveries are not to exceed 70 cents per ton.

Kickapoo is 113 miles from Chicago on the Chicago & Eastern Illinois. It is just beyond the average distance of sand and gravel pits in what is known as the outer zone of the Chicago district, while Algonquin is treated in the report, written by Commissioner Woolley, as a representative inner-zone point. In 1907, the Kickapoo pits were opened and the rates were made by the Chicago & Eastern Illinois to approximate the charge then applied for connecting line deliveries on shipments from the inner zone, the average distance of which from Chicago is 50 miles, while the average distance from the outer zone is 93 miles.

That relationship continued for ten years, with a little interruption in 1914, when the Commission made its five per cent decision. The decision put up the interstate rates. The Illinois commission, however, declined to allow the advance on intrastate business, so the basis established in 1907 was restored and continued until 1917, when the Commission's decision in the fifteen per cent case sent the relationship into the air.

Admitting that the rate on sand and gravel from the outer zone to Chicago is undoubtedly low, Commissioner Woolley remarked that the commodity is also the lowest class of commerce, influenced by so small a difference in rates as one-fourth of a cent a hundred pounds, or five cents a ton. Such a difference, he said, would keep shippers out of the Chicago market, which has been the plight of the complainant. Commissioner Woolley said that the discrimination against which the Kickapoo producer complained could easily have been avoided. The local rate from Kickapoo, he said, was increased 25 per cent, in accordance with the Director-General's order, while the local rate from Ginger Hill was increased only 2.5 per cent. The joint rate from Kickapoo was increased 20 per cent, while there was no increase in the joint rate from Ginger Hill.

The decision of the Commission was that the rates were unreasonable and unduly prejudicial from April 22 to June 25, 1918, to the extent that they exceeded rates from Ginger Hill and thereafter to the extent that the rate from Kickapoo to Chicago and points in the Chicago switching district for local delivery exceeded the Ginger Hill rate for local delivery.

It was held that the Director-General did not avail himself of the increase permitted by General Order No. 28 in respect of the rates from joint and belt line deliveries from Ginger Hill, thereby unduly preferring that point. Therefore, the rate from Ginger Hill, after June 25, was two cents under the rate from the inner zone, although it is 93 miles from Chicago, which is the average distance of the outer zone points from Chicago.

Joint Committee on Wisconsin Highways Reports

AT A CONFERENCE in Madison, Wis., December 3 and 4, 1919, of all interested parties in the road-building program, a committee of twelve men was appointed and called the cost accounting committee—five contractors, five highway officials, one material man and one machinery man. O. C. Hubbard, executive secretary of the Wisconsin Mineral Aggregates Association, was chosen to represent the material interests and also was made secretary of the committee. A meeting was held January 23 and 24, 1920, in Milwaukee, and adjourned to January 29 in Madison. Below is a copy of the recommendations of this committee, which particularly affect the mineral aggregates interests:

"Motion made, seconded and carried that it was the recommendation of this committee that contractors be allowed certain percentages on material furnished, provided they can satisfy highway officials that bills for material have been paid or authorize the state to pay material bills direct; that it is the recommendation of this committee that as much as possible of 1921 work be let in the fall of 1920, particularly where a winter haul is possible; that it was the recommendation of this committee that the state require the delivery at siding or on the job, of certain percentages of the several materials to be used in the road construction, immediately following the award of contract and where no materials have already been provided."

These recommendations were made on January 24, and A. R. Hirst, state highway engineer, was invited to attend the conference January 29. He found no fault with the recommendations and tentatively agreed to endeavor to work them out.—Wisconsin Mineral Aggregate Association "News Letter."

No German Competition for Our Potash Producers

BERLIN—The German Potash Syndicate announces that it is able to supply only slightly more than one-third the home demand, which this year totals 15,000,000 double hundredweights.

Orders from abroad almost equal this amount, resulting in a situation which is forcing the syndicate to decline foreign deliveries. The output is still seriously handicapped by lack of coal. The directors assert that the situation can only be corrected through the abolition of the eight-hour day in railroad shops and the introduction of piece work.

Stairs and Stairways

(By the National Safety Council)

STAIRWAY ACCIDENTS in the United States in 1916 caused the deaths of 1,149 people and crippled for life more than 4,000. In New York there were 137 and in Chicago 83 deaths from this cause in 1916. The accident hazard of unsafe stairs has been recognized by state labor law requirements for the safe construction of stairways.

Landings

Landings on stairways half-way between floors are desirable to give a short rest or change to tiring muscles. Long stairways may be divided into approximately twelve-foot sections by a similar method.

Avoid doors opening on stairs. Provide landings sufficiently large to afford safe standing room outside of space required by swing of door.

Ordinarily, landings of the same material and strength as the stairs will be satisfactory.

Treads

Stair treads and landings should be of sufficient strength to bear the maximum number of people that can stand upon them. Building codes generally require that the stair shall safely carry a load of 100 lbs. per square foot, at the usual safe working stresses.

The width of treads and height of rise should be uniform for each flight of stairs. The tread should provide ample space on which to place the full length of the foot when descending, without danger of striking the heel against the riser above; but not so wide as to compel an increased stride. It is good practice to make the tread width (exclusive of nosing overhang), plus twice the riser height, equal to 25 in. In using this rule the thickness of the tread should be added to the height of the riser. The tread width should be further increased with a nosing overhang of ⅞ to 1¼ in.

There are three classes of stair tread materials—unsafe, normal and safe. Unsafe materials are iron and steel on which slipping is possible at all times. The normal type of tread is safe under ordinary conditions but mud, oil, or wear renders it unsafe. To this class belong wood and other materials. The safe type retains an effective and anti-slip quality for long periods even under exceptionally severe traffic. To this class belong cork, asphalt mastics, iron-abrasive and lead-abrasive types of anti-slip treads.

Wooden treads require frequent inspection and careful repair. Anti-slip plates placed over the worn treads make them safe and more durable than when new.

Nosing

The portion of the tread extending beyond the top of the "riser" (the rear or upright board of a lower step) is referred to as to the "nosing."

The nosing is designed to prevent the back of the shoe coming into contact with the riser when the wearer is descending a stairway. Should contact occur, the foot is thrown forward to the edge of the tread and the tripping hazard is greatly increased. A nosing of ⅞-in. is considered sufficient in stairways used by men, while 1¼ in. is recommended when stairs are to be used by women, the additional space insuring clearance for skirts, between shoe heel and riser.

The under edge of the nosing should be rounded or beveled to prevent the possibility of the shoe catching when ascending stairs.

Risers

The height of the rise in conjunction with the width of tread determines the angle of the stairs, which should be between 30 and 36 deg. from the horizontal.

Risers should be used. If the economical use of material is necessary, then at least a toe piece, not less than 1 in. high, should extend along the top side at the back of the tread.

If the stairway is properly supported and braced, the riser will not bear any particular strain and no special caution is necessary, except that the risers should be invariably of the same height in each run of stairs.

Toe-Boards

When the stringers of stairs do not accomplish the purpose, toe boards should be added and made to fit snugly to the sides of treads and risers and extend not less than three inches above the nosings. Outside stairways, and those used by women may be supplemented by toe-boards to an additional height. When stairways or runways are used for transporting materials a wire mesh guard should be attached to toe-board and hand rail.

Hand Rails

Stairways 3½ ft. or more in width should have hand rails on both sides. Open stairways, regardless of width, should have hand rails on both sides. Stairways over 7 ft. in width should have hand rails on both sides and in center.

Measured from the center of the tread the hand rail should be about 42 in. high. This height is recommended because the average adult, accidentally falling against the railing in ascending a stairway, will strike with his weight under rather than above the rail. If the rail is properly braced, it will take up the force of the impact, and the intermediate rail will prevent the workmen falling outside of the stair or runway. A young person would be saved from falling by the intermediate rail and toe-board.

Hand rails should be substantially built and inspected at regular intervals to insure perfect repair. An intermediate rail should be provided about midway between the toeboard and the upper or hand rail. The selection of material and the design of construction should be carefully considered.

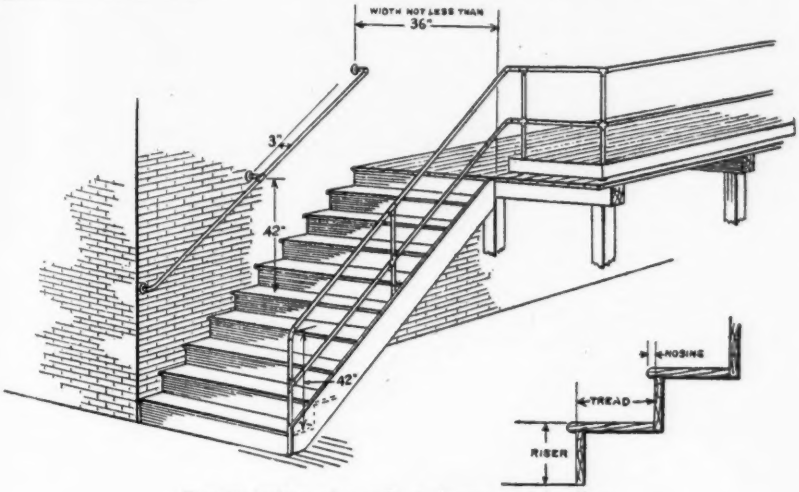
Steel or iron angles or pipes is the best material if the railings will be subjected to strain. Wooden rails, if straight-grained and free from knots, imperfections, and splinters, are sometimes used when the traffic is light.

Rails made of angle iron or steel should have chamfered edges, an even smooth surface, and the ends rounded or flush with upright. Supporting posts should be finished in a similar manner.

Pipe, 1¼ to 1½ in. in diameter with malleable fittings, counterbored sufficiently to extend at least ¼-in. beyond threads in pipe, or 2x2¼-in. angle steel for top rails and ¼x2-in. flat for intermediate rail; or 2x4-in. wooden top rail and 1x6-in. intermediate rail, will provide safe conditions. When metal hand rails are used, supporting posts or braces should be spaced not more than 12 ft. apart. The railing will be stronger and safer if riveted instead of bolted together. In wooden construction it will be found

advisable to space posts not more than 8 ft. from center to center to insure rigidity. Supporting posts and braces should be of the same or larger dimensions than the railings.

imity to a crane runway, dangerous machinery, running belts, shafting, or traffic hazard, strong detour guard rails should be built and well braced to deflect traffic from the hazard.



Detail design of a safe stairway and landing

Hand rails of enclosed stairways should extend about 3 in. from the wall to provide space for hand to grip the railing and avoid scraping fingers on wall. When stairs are 7 ft. or more in width an intermediate center rail is necessary for the safety and convenience of persons using the central part of the stairway. This rail is particularly desirable in public buildings.

Stairways exposed to the weather should be given special consideration, both in construction and inspection. Anti-slip treads must be kept clean and maintained in good repair at all times. Stairs with such treads are usually intended for emergency use, and unless they are safe they are a menace.

Lighting

Stairways never should be located in dark places unless ample artificial light is provided. Electric globes should be so shaded as to throw their light on the stair and not in the eyes of the stair users. Especially good light should be provided at the commencement of each flight, at landings and platforms, and at the points of ascent and descent, so the first tread and riser are clearly visible, as they are more important than the intermediate steps.

Head Room

It is important in designing stairways that sufficient head room be obtained either in the stair-well hole or beneath the flight immediately above. The vertical clearance should be not less than seven feet, measured from top of tread on a line with face of riser.

Approaches and Detours

When a stairway ends in direct prox-

The floor at the head or foot of a stairway should always be level, or nearly so. This is especially important in exterior stairways.

Whether inclosed or not, stairways never should have an entrance close to the top or bottom riser, nor adjacent to a landing or the end of a stair flight. The entrance should be not less than 4 ft. from the nearest riser, to prevent falling and collision hazards.

Obstructions

No obstruction of any kind should be allowed in passageways leading to fire escapes, or on balconies, platforms, stairs, or landings of escapes.

Each outside runway or stairway should have a cover or roof to keep off snow and ice. If a cover is not provided, snow and ice should be immediately removed.

Suggestions

Do not permit employes to sit, or rest material or tools, on guard rails. Abuse of the intermediate rail should likewise be prohibited—this rail is a safeguard and is not intended as a foot rest or a retaining guard for material.

Avoid cleats on stair treads.

Ribbed surfaces or grooved material, placed where it may catch the shoe heel, should not be used for stair treads.

Inclines intended for wheelbarrow service should be built of an odd number of planks. This will afford an even passageway for wheels in the center.

It is recommended that the pitch of stairs and width and material of treads be uniform throughout the works.

If stairs are of metal construction, countersink or tap all fastenings, and chamfer sharp edges and round corners.

Splinters, nails, patches or irregularities due to breaks or cracks in treads or surfacing materials are dangerous and should not be tolerated.

Slippery treads should be given immediate attention. If this condition is caused through wear, give instructions for repair, and be sure the order is enforced. If the condition is due to oil, refuse, or weather conditions, an employe should be placed on duty to give warning until remedy is applied.

Some safety engineers suggest that stair treads be built of a light colored material, or painted a lighter tint than the risers, to make the steps stand out.

A door opening directly onto a stairway is dangerous. A door so situated should be moved back and a vestibule built in the room.

Keep stairs dry.

Keep stairs free from obstructions.

Keep stairs clean.

One Serious Accident

ONE SERIOUS ACCIDENT costs you more than your membership dues in the National Safety Council for one hundred and twenty years. And the potential benefit resulting from that membership is almost unlimited.

With the National Safety Council's organized educational Accident Prevention plan in operation, it has been found that reductions of at least seventy-five per cent can be obtained. Consider what this might mean to you in actual dollar saving.

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Bear in mind that the National Safety Council is NOT a commercial enterprise; that it is a co-operative non-commercial, non-profit association of almost 4,000 of the largest industrial concerns in the United States and Canada; that it has in its possession practically all of the authoritative accident prevention data available.

The National Safety Council asks you to become a member, because it can give you a service from which you derive a tangible benefit and because increased membership enlarges its scope and increases its effectiveness.

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Random Comments on the Issues of the Day

Industrial Democracy

The term *industrial democracy* is getting to be such a hackneyed one that the conscientious editor begins to fear its very use will detract from the subject matter it is used with. However, no apologies are necessary for printing reputable examples of so-called industrial democracy, because every employer realizes the importance of finding a solution to the problem of getting laborers to labor, and all bona fide contributions to the subject are of value.

Recent statistics give the number of deaths in this country from influenza and pneumonia since the epidemic began in the fall of 1918, as about 1,500,000. Probably more than a half a million people have emigrated from this country since the war (and prohibition). Influenza deaths were chiefly among people in the active stage of life. So we have lost in something over a year more than 1 per cent of our total population, or possibly 5 per cent of our active producers.

This loss can not be made good for a number of years at best, so that there obviously is a real shortage of productive labor supply. Moreover, our complicated system of government and present-day civilization in general are constantly taking men out of productive work into unproductive lines. Add shorter hours of labor, and a blind man can see it is mighty hard to get anything done, and it is constantly getting more so.

The only way to prevent an eventual upheaval of our whole economic structure seems to be to find a way of getting those who do productive work, to produce more. It can't be done without inspiring in them the *will* to produce more. Industrial democracy seems to be a feasible way to do this, judging by the experience of those who have tried it.

Industrial Insurance

A prominent Illinois quarry operator, commenting on the note on this subject in our January 31 issue, states: "Do you know that the rate covering quarry work in Illinois is now $7.12 per $100 of pay roll? Four years ago it was $3.84. It really seems to me that state insurance in Ohio, so far as rates are concerned, works favorably to the employer."

Now, lots of quarry men outside of Ohio wonder why Ohio quarry men kick about a $4.50 rate. Of course, the kicks always come from quarrymen who have good records, and who are paying for the losses of those who have bad records. As we understand it, the legitimate kick is not so much against the rate itself, as against a system which does not permit an operator to profit by the measures he takes to prevent accidents.

Self-insurance, the right kind of a mutual company or of an old-line company, would all make it possible for a careful employer to profit by his care. They could select their risks, inspect plants and do away with many hazards.

Liability insurance rates on quarry and gravel plant operation are built up on very incomplete accident reports—reports which undoubtedly include accidents at side-of-the-road and fly-by-night plants and other operations which are much more hazardous than those involved in the average commercial plant. The trouble is no insurance man has had sufficient knowledge of the industries to be able to classify such statistics, even if they were available. The result is, in the absence of accurate data, the rate is always put high enough to cover all possible contingencies.

The solution lies in the quarry and gravel plant owners and operators themselves taking an active part in collecting and digesting accident statistics, and making use of these data to get justice and fair treatment both from insurance companies and from state insurance commissions. The injustice which exists is undoubtedly due to lack of appreciation of what a commercial sand and gravel or quarry operation really is, and is not surprising in view of the very rapid development of the industries in the last few years.

Memorable Conventions

This week has seen two record-breaking conventions in the rock products industry—the National Crushed Stone Association at Louisville, Ky., and the National Association of Sand and Gravel Producers at Chicago. At each convention the big issues were identical—the transportation situation, labor, etc.—and the big problems were the same—how to finance the organizations, how to gain prestige and influence.

In going from one to the other, one could not but be struck by the fact that here were two groups of men whose national interests were identical, each trying to accomplish the same things, each handicapped by the same obstacles, but neither willing to make the first real move to join hands in the common cause.

True it is that these two groups clash in certain promotional efforts—but this matter of promotion is almost entirely a local matter, as neither group has yet been able to determine on a national plan for promotional work which would suit all local conditions in its own industry, nor is it likely such a plan is possible.

It is to be hoped that out of these 1920 conventions will come a joint transportation committee which will be the means of harmonizing the work of these two great, growing associations, at least so far as national interests are concerned. Possibly by another year they may be in such mood as to meet in the same city at the same time, for the same problems are likely to be with us then and for some time to come.

NEW MACHINERY AND EQUIPMENT

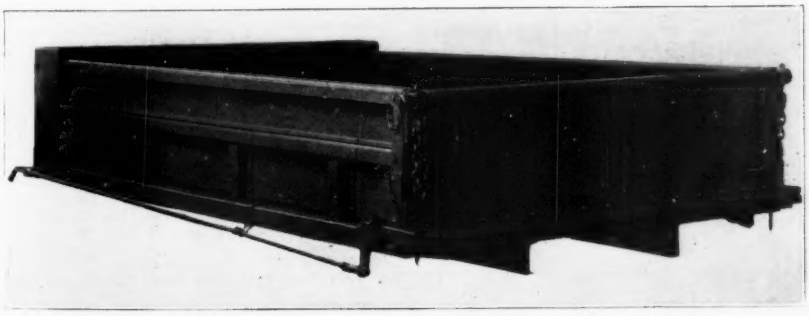
Motor Truck Combination Steel Dump Body

TRUCK FLEET OWNERS handling rock products such as crushed stone, sand, gravel and the like, who wish to keep their trucks moving during the slack period of the year will find the "4 in 1" combination steel dump body, manufactured by the Heil Co., Milwaukee, Wis., especially useful.

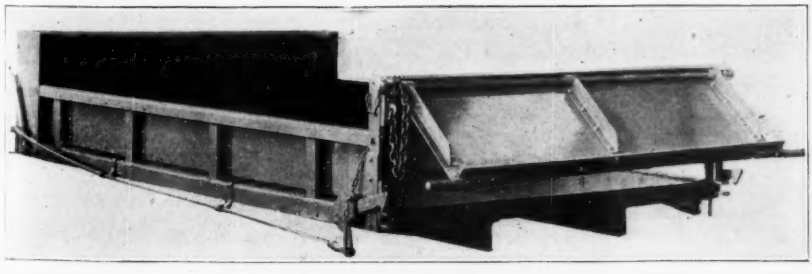
The body is furnished with two sets of removable sides and double-acting tail gate. This makes it possible to convert the body in a few minutes from a standard gravel body into one for carrying pipe, lumber, cement blocks, bricks or other bulk material. With both sets of sides it has the proper capacity for hauling quick lime, earth, etc.; with one set of sides it has the proper capacity for hauling gravel or crushed rock. By removing both sets of sides it becomes a platform body fitted with stake pockets and can be used for general haulage.

By removing pins in the top hinge rod the tail gate will fold down the same as an express tail gate. It is held in this position by chains and hooks.

The bodies are all substantially made and are designed to fit any make or model of truck on the market. In length they range from 10 ft. to 12 ft.; in width 4 ft. 6 in., to 6 ft.



Combination steel dump body with tail gate and side boards in place



Side boards removed and tail gate raised

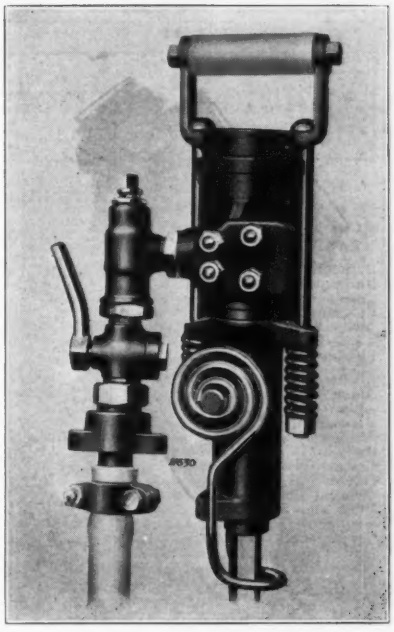
A New "Jackhamer"

THE INGERSOLL-RAND CO. has developed a new member of its well-known "Jackhamer" group of hand-hammer drills. This machine, known as the BAR-33 "Jackhamer," is smaller and lighter than other Ingersoll-Rand machines of a similar construction.

Its weight of 21½ lbs.—a feature which permits the use of a drill in locations and positions not accessible to heavier machines.

The manufacturer recommends this light drill for bench work in soft limestone quarries, and for pop hole work in quarries and open-pit mines. In addition to the above the machine may be conveniently used for drilling holes in concrete and masonry foundations.

The BAR-33 is the fourth type of "Jackhamer" manufactured by the Ingersoll-Rand Co. Machines of this type are now available varying in weights: 21½-35-41, and 70 lbs.



Bar-33 "Jackhamer" hand drill

Crushing Plant Manufacturer Publishes Record of War Activities

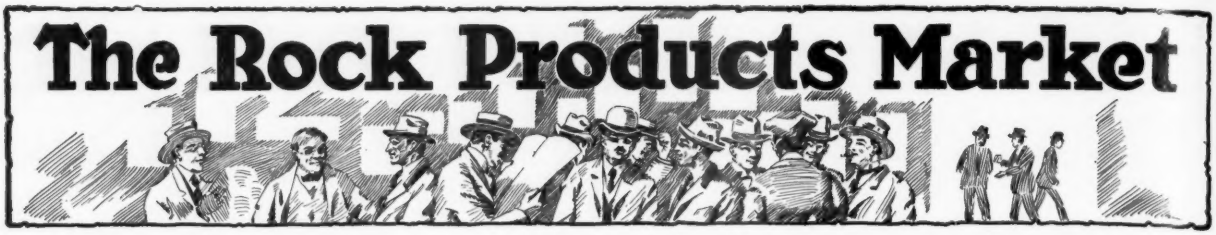
"FOR THE GLORY OF AMERICA," is a 142-page book of unusual merit and beauty. It is published by the Traylor Engineering and Manufacturing Co., Allentown, Pa., and is dedicated to the company's employees who worked in its huge munition and shipbuilding plants. It is a history of the development of the company and its war activities.

The rapid growth of the manufacturing company from a small machine shop in East Orange, N. J., to the present complete plant at Allentown, Pa., is detailed at length with many illustrations.

At the outbreak of the war S. W. Traylor, founder and builder of this large industry, went to the aid of the British government with an offer to manufacture a million 18-lb. high explosive shells. Other war contracts followed in rapid succession, including the building of marine engines, boilers, wooden ships and truck mounted rock crushers to be sent to France for road building.

The book is admirably written, illustrated, printed and bound; and it is a valuable contribution to the industrial history of the great war. It forms an attractive record of the remarkable manner in which a typical American manufacturing plant rose to meet the demands of the Allied Governments in a great emergency. The author is G. B. Livingood, sales engineer of the company at Allentown.

The Rock Products Market



Wholesale Prices of Crushed Stone

Prices given are per ton. F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.			From stock, 1.50 per net ton, all sizes			
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	.....	1.75	1.65	1.35	1.25	1.25
Coldwater, N. Y.			Flux, 1.50@2.10			
Limekiln, Md.	1.25	2.10	2.00	1.75	1.40	1.25
North Leroy and Akron, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00‖
Pittsburgh, Pa.	1.25	1.40	1.50	1.50	1.50	1.50
CENTRAL:						
Alden, Ia.	.70	.70	1.35	1.35	1.35	1.35
Alton, Ill.	2.00	2.50	1.50	1.50	1.50	.....
Bettendorf, Ia.			1.50 per cu. yd., all sizes			
Brillion and Sherwood, Wis.	.90@1.00	.....	1.00	1.00	.....	1.00
Buffalo, Ia.	.90	1.45	1.35	1.25	1.25	.....
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*	.....	.....
Dundas, Ont.	.65	1.20	1.20	1.20	1.00	1.00
Eden and Knowles, Wis.	1.00@1.10	1.10@1.20	1.10@1.20	1.10@1.20	1.10@1.20	.....
Elmhurst, Ill.	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25
Greencastle, Ind.	1.50	1.25	1.10	1.00	1.00	1.00
Hull, Canada	2.50	2.30	2.50	2.10	2.00	1.75
Illinois, Southern	2.00	1.50	1.50	1.50	1.50	.....
Krause, or Columbia, Ill.	1.80	1.30	1.50	1.40	1.30	1.30
Laumon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.40	1.40	1.40	1.40	1.40	1.40
Moline, Ill.			1.50—2300 lbs. all sizes			
Montrose, Ia.	1.25	1.15@1.25	1.15@1.25	1.10@1.25	1.10@1.15	.....
Oshkosh, Wis.			1.40 per ton, all sizes			
Ottawa, Ont.	2.50	2.75	.....	2.25	2.00	.....
River Rouge, Mich.	.....	1.50	1.50	1.50	1.50	1.50
Sheboygan, Wis.			1.00 to 1.25 all sizes			
St. Louis, Mo.	.60	1.60	.....	.....	.....	.....
Stone City, Ia.	.80	.....	1.60	1.50	1.40	.....
Toledo, Ohio. f. o. b. cars	1.60	1.90	1.90	1.80	1.60	1.60
Toronto, Canada	1.55	2.25	2.25	2.25	2.05	2.00
SOUTHERN:			These prices include 90c freight			
Brooksville, Fla.	1.00	.....	.....	2.25	2.25	.....
Cartersville, Ga.	.....	2.25	2.10	2.00	.....	1.90
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	1.00
Hopkinsville, Ky.	1.25	1.10	1.10	1.10	1.10	1.10
Mascot, Tenn.	.....	1.50	1.50@1.75	1.50@1.75	1.50@1.75	.....
Memphis Jct., Ky.			1.10@1.35, all sizes			
New Braunfels, Tex.	.60	1.75	1.65	1.50	1.50	1.50
Winnfield, La.	.80	2.50	.....	2.00	2.00	.....
WESTERN:						
Atchison, Kans.	.50	2.00	2.00	2.00	1.90	1.90
Blue Springs and Wymore, Neb.	.20	1.75	1.75	1.65	1.55	1.50
Kansas City, Mo.	.60	2.00	.....	.....	.....	.....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.	.....	.90	2.75	2.50	2.00	1.75
Bernardsville, N. J.	.....	2.80	2.60	2.20	.....	.....
Bound Brook, N. J.	1.00@1.25	2.00@2.25	1.80@1.90	1.60@1.80	1.50@1.70	.....
Branford, Conn.	.80	1.50	1.50	1.20	1.10	.....
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40	1.40
Castro Pt., Richmond, Cal.	.50*	.....	1.50*	1 50*	1.40*	.....
Dresser Jct., Wis.	.75	2.25	2.25	2.00	1.70	.....
Duluth, Minn.	.75	1.75	1.50	1.15	1.15	.....
E. Summit, N. J.	2.00@2.25	2.25@2.50	2.00@2.25	1.75@2.00	1.75@2.00	.....
Glen Mills, Pa.	1.00	1.35	1.70	1.55	1.35	1.35‖
Millington, N. J.	1.80	1.80	1.80	1.60	1.00	.....
New Britain, Conn.	.80	1.30	1.25	1.20	1.00	.....
Westfield, Mass.	.60	1.20	1.10	1.00	.90	.80

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
Little Falls, N. Y.—Syenite	.80	1.20	1.40	1.20	1.20	1.20‖
Mayville, Wis.	.90@1.00	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Middlebrook, Mo.—Granite	3.50	.....	1.75	1.75	.....	1.00‡
Portland, Maine—Granite	1.50	.....	.....	1.35	1.25	.....
Roseburg, Ore.	.....	1.50	1.25	1.05	1.00	1.00
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	.....
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20	1.20‖
Granite	1.25	.....	1.50	1.50	1.50	.....

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Coldwater, N. Y.—Analysis, 56.77% $CaCo_3$, 41.74% $MgCo_3$—80% thru 100 mesh; bulk	3.00
Ppr.	4.50
Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); ppr., 4.00; bulk	2.50
Paper bags	4.00
Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk	3.25
Grove, Md.—90% thru 4 mesh; bulk	3.00
Hillsville, Pa.—Analysis, $CaCo_3$, 96% (90% thru 100 mesh); bulk	2.75
Sacks	4.50
Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk	2.25
Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk	2.75
West Stockbridge, Mass. — Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85
Williamsport, Pa. — Analysis, $CaCo_3$, 88-90%; $MgCo_3$, 3-4%—(50% thru 50 mesh); bulk	3.00
Bags	4.50
CENTRAL:	
Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—50% thru 4 mesh	2.50
Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, 98.5%; $MgCo_3$, 0.5%	1.75
Belleville, Ont.—Analysis, $CaCo_3$, 90.9%; $MgCo_3$, 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk	2.50
Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh	1.00
Columbia, Ill., near East St. Louis (½" down)	1.25@1.80
Ellettsville, Ind.—Analysis, Carbonate, 98%	2.00
Elmhurst, Ill. — (Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis, $CaCo_3$, 98%) 50% thru 50 mesh	1.75
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Kansas City—(50% thru 50 mesh)	2.00
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$	2.00
Marble Cliff, O.—(50% thru 100 mesh) Analysis, $CaCo_3$, 86%; $MgCo_3$, 8%	2.50
Marblehead, O. — (Analysis: $CaCo_3$, 95.33%) 100% thru 100 mesh, sacks, 4.75; bulk	2.75
McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04% — 100% thru ¼" sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 26.04% thru No. 50; 16.27% thru 100	.90@1.00
Milltown, Ind.—Analysis, $CaCo_3$, 94%; $MgCo_3$, 3%—(100% thru 4 mesh)	1.50
Montrose, Ia.—(90% thru 100 mesh)	1.25
Muskegon, Mich.—(90% thru 50 mesh) Analysis, $CaCo_3$, 53.35%; $MgCo_3$, 43.27%	2.50
Piqua, O.—Analysis: $CaCo_3$, 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—70% thru 100 mesh; bulk	2.75@4.50
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ½" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82%	2.00
St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12%	1.50
Stone City, Ia.—Analysis, $CaCo_3$, 98% (50% thru 100 mesh)	.80

Agricultural Limestone

Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen)	1.80

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Whitehill, Ill.—Analysis, $CaCO_3$, 96.12%; $MgCO_3$, 2.50%—
90% thru 50 mesh, bulk 2.00
90% thru 100 mesh 5.00

SOUTHERN:

Cattersville, Ga.—Analysis: 96 to 98% combined carbonates—All thru 10 mesh with all dust in 2.50

Clarement, Va. (Marlime)—Analysis, 90.94% $CaCO_3$, 0.31% P., 1.36% Mg., 0.37% K.; bulk 4.50
100 lb. ppr. bags 6.00
100 lb. cloth bags 6.50

Dittlinger, Tex.—Analysis, $CaCO_3$, 99.09%; $MgCO_3$, .04%.
90% thru 100 mesh 2.00
90% thru 4 mesh 1.00

Grovania, Ga.—Analysis, $CaCO_3$, 95%; $MgCO_3$, none—50% thru 100 mesh 2.50

Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCO_3$—Bulk 2.00

Marion, Ga.—Analysis, 90% $CaCO_3$—(50% thru 100 mesh) 2.00

Memphis Jct., Ky.—(Analysis, $CaCO_3$, 95.31%; $MgCO_3$, 1.12%); average price, ⅛ in. down 2.00

Mascot, Tenn.—Analysis, $CaCO_3$, 52%; $MgCO_3$, 38%.
(80% thru 100 mesh) 2.75
(All thru 10 mesh) 2.25
(80% thru 200 mesh) 4.00
Paper bags, $1.50 extra per ton; burlap, 2.00 extra per ton.

Maxwell, Va. 2.50

Mountville, Va.—Analysis, $CaCO_3$, 76.6%; $MgCO_3$, 22.8%—100% thru 20 mesh; bulk 4.75
100 lb. ppr sacks 5.75

Ocala, Fla.—Analysis, $CaCO_3$, 98%—(75% thru 200 mesh) 4.50

Tyrone, Ky.—Analysis, $CaCO_3$, 93%; $MgCO_3$, 6%—90% thru 4 mesh 2.25

Winnfield, La.—(50% thru 50 mesh) 3.00

WESTERN:

Cement, Calif.—50% thru 50 mesh 4.00

Colton, Calif.—Analysis: $CaCO_3$, 95%; $MgCO_3$, 1½%; bulk, 2.50; bags, Sacks, 15c extra, returnable. 3.50

Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk 1.35

Terminous, Calif.—Analysis, 94% $CaCO_3$, 1.4% $MgCO_3$—(60% thru 200 mesh; 90% thru 100 mesh; 100% thru 40 mesh); bulk 4.00
Sacked 4.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va. ..... 2.25@2.75
Special hand selected rock 2.50
Bridgeton, N. J. 2.00
Cedarville and South Vineland, N. J.—
Glass, damp 2.00
Glass, dry 2.50
Gray Summit, Mo. ..... 2.00@2.50
Guion, Ark.—Carlots 2.00
Klondike and Pacific, Mo.:
Contracts 2.00
Carlots 3.00
Mapleton, Pa. 2.50
Glass, damp 2.00
Massillon, Ohio 3.00
Michigan City, Ind.— ..... .30@ .40
Millington, Ill.—Contracts 2.00
Mineral Ridge, O. 2.75
Montoursville, Pa.—Green, washed 1.50
Oregon, Ill.—Large contracts 1.75
Open market 2.50
Ottawa, Ill. ..... 1.75@2.50
Robinson, Md., washed, screened, not dried 2.00
St. Marys, Pa.—Green 2.50
Sands, Elk Co., Pa.—Selected, green 2.75
Thayer, W. Va.—Washed 2.50
Unwashed 2.00
Utica, Ill. ..... 1.75@2.50

FOUNDRY SAND:

Albany, N. Y.—Core ..... 1.50@2.50
Furnace lining ..... 2.25@2.75
Molding coarse, fine 2.50
Brass molding 2.50
Sand blast ..... 2.75@4.00
Allentown, Pa.—Core ..... 1.50@1.75
Molding coarse 1.50
Arenzville, Ill.—Molding fine ..... 1.50@1.75
Beach City, Ohio—Core 2.00
Green silica sand (not dried) 2.00
Washed silica sand (not dried) 2.25
Bowmantown, Pa.—Core 1.25
Furnace lining 2.50
Molding, fine and coarse 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		1.00		1.00	.80	.80
Attica, N. Y.	.65	.65	.65	.75	.75	.75
Concord Jct., Mass.	1.00	1.00	1.25	1.25	1.25	1.25
Farmingdale, N. J.		.75				1.50
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Ludlow, Mass.		60*	1.25		1.10	
Morristown, N. J.	.60	.60	1.20	1.00	1.00	
Portland, Me.	.50	1.50		1.35	1.25	
Washington, D. C. (F. O. B. wharves on cars)	.75	.75	2.00	1.40	1.20	1.20
Yardsville, N. J.			.50@ .75, all sizes			
CENTRAL:						
Alton, Ill.	.60@ .75	.60@ .75	1.50@4.50	1.30	1.20	1.20
Anson, Wis.		.60		1.25@1.50		1.00@1.25
Attica, Covington, Silverwood, Ind., Palestine, Ill.	.75	.75	.75	.75	.75	.75
Barton, Wis.	.85	.80	1.00	.80	.80	.80
Beloit, Wis.			.50 sand, .70 gravel			
Chicago, Ill.		1.30@1.40	1.30@1.50			
Covington, Ind.	.75	.75	.85	.75	.75	.75
Earlestead (near Flint), Mich.	.60	.60				.70
Eau Claire, Wis.					1.10	
Elgin, Ill.		.80	1.00	.80	.80	.80
Ft. Dodge, Ia.	1.35	1.25	2.15			2.05
Ft. Jefferson, Mechanicsb'g, O.	.50@ .60	.50@ .60	.50@ .60	.60@ .70	.60@ .70	.60@ .70
Grand Rapids, Mich.	.50	.60	1.00	.90	.80	.80
Grass, Mich.		1.00	1.60	1.20	1.20	1.20
Hersey, Mich.	.50			1.10		
Indianapolis, Ind.	.60	.60		1.50	.75	.75
Mason City, Ia.	.85	.75	1.65	1.60	1.50	1.40
Milwaukee, Wis.	.70	.70	.80	.80	.80	.80
Minneapolis, Minn.	.50	.50	1.75	1.75	1.50	1.50
St. Louis, Mo., F. O. B. cars	2.20@2.25		2.50	2.30	2.30	2.25
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.75		.85	.75	.75
Yorkville, Moronts, Oregon and Ottawa, Ill.	.70	.70	.80	.80	.80	.80
SOUTHERN:						
Alexandria, La.		.80				1.50@1.75
Arkansas City, Ark.		.75				
Knoxville, Tenn.	1.15	1.15	1.50	1.50	1.50	1.40
Lake Weir, Fla.		.60				
Lincoln, Neb.	.90	.90	2.20	2.20		
Macon, Ga.		.75				
N. Martinsville, W. Va.		1.10@1.20				
Pelzer, S. C.	.70	.70				
Roseland, La., and Condron, Miss.		.35			1.25	
Thomas, La.	.60					1.75
Tulsa, Okla.		.70				
Valde Rouge, La.		.80				1.25@1.50
Waco, Texas	.70@ .80	.70@ .80				1.10
WESTERN:						
Kansas City, Mo.			(Kaw river sand .75 per ton, carlots)			
Niles, Calif.	.80@1.00	.70@ .85	.75@1.00	.70@1.00	.70@1.00	.70@1.00
Pueblo Col.	.95*	.75*		1.50*		2.00*
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Vancouver, Wash.		1.30*	1.45*	1.30*		1.10*
Yorkville, Ore.	.60	.60@ .75	.70	.60@ .75	.60	.50@ .60

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.75	.75				
Burnside, Conn.	.80*					
Fishers, N. Y.			.70@.75 per ton, all sizes			
Yardville, N. J.		.50@ .75				
York, Pa.		1.10@1.30	(crushed rock sand)			
CENTRAL:						
Attica, Covington, Silverwood, Ind., Palestine, Ill.	.60	.60	.60	.60	.60	.60
Earlestead, (near Flint, Mich.)			.60 per yd.			
Eau Claire, Wis.					.75	
Escanaba, Mich.			1.00 cu. yd., all sizes			
Grand Rapids, Mich.	.40			.75		.60
Grass, Mich.		.60	1.00	1.00	1.00	1.00
Hersey, Mich.	.40			.60	.60	
Illinois, Northern						.50@ .60
Janesville, Wis.		.65			.75	
Lincoln, Neb.			Sand gravel mix, 1.30			
Oxford, Mich.			Including cobbles, $1.00 per yd.			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Wabash Valley District, Ind.			.60 for all sizes			
Yorkville, Moronts, Oregon and Ottawa, Ill.			Pit run, .60			
SOUTHERN:						
Albany, Ga.	.70@1.00					
Dudley, Ky. (Crushed Sand)		.95		1.00		
Gravel Siding, Miss.			Mine run 45c per ton			
Lindsay, Tex.	1.00					.50
Thomas, La.						.40@ .70
Valde Rouge, La.						.60@ .75
Waco, Texas						.95
WESTERN:						
Niles, Calif.	.25@ .40					
Pueblo, Col.			River Run, .75* unscreened			
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ore.		.40			.40	

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Buffalo, N. Y.	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Cleveland, Ohio.		.85		1.05	1.05	.95	.95
E. Canaan, Conn.	4.00	1.00	1.50	1.25	1.10	1.10	1.10
Erie, Pa.	2.00	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.		1.25	1.25	1.25	1.25	1.25	1.25
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Hokendaugua and Topton, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Lebanon (Donaghmore), Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	1.00	1.50	1.00	1.00	1.00	1.00
Pittsburgh, Pa., Dist.	2.05	1.15	1.50	1.15	1.15	1.15	1.15
Sharpsville, Pa.	2.00	1.20	1.60	1.20	1.20	1.20	1.20
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton and Jackson, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Toledo, O.	All sizes, 2.00, F. O. B. Toledo						
Youngstown, Dover, Hubbard and Leetonia, O.	2 00	1.20	1.60	1.20	1.20	1.20	1.20

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.		7.50@8.00	65		
Apollo, Pa.	3.25		95.14	1.44	
Bellefonte, Pa.	7.00		98.5	.72	
Berkeley, R. I.		14.00	45	15	
Bridgeport, Pa.	7.50@9.00		55	44	9.00@11.00
Cavendish, Vt.	2.50 bbl. in car lots				
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Pa.	5.50@6.00		78.67	1.33	
Farnams, Mass.	5.50	7.50		0-2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove City, Pa.	3.25	4.50	94.75	1.20	10.25
Grove, Md.	8.00				10.75
Highgate Springs, Vt.		8.00	85	2	
Hollidaysburg, Pa.	5.50@8.00		94.68		
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Bluff, Pa.	5.00@6.25		78.67	1.33	
Lime Kiln, Md.	8.00	10.75			10.75
Lime Ridge, Pa.	5.00@6.25		80.56 to 62.56	3.87 to 1.75	
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang, Pa.	5.00		60	12	
Rosedale, N. Y.	8.00		96	5	(Bulk, 6.00)
Sandville, O.					9.00
Steuben, Pa., Dover Plains, N. Y., York, Pa.		7.00@9.50	70		10.75 to 12.00
Union Bridge, Md.	8.50		73	1	10.75
Williamsport, Pa.	5.50	10.00	65 to 80	2 to 4	10.00
Williams Station, Pa.	7.50		60.6	39.1	9.75@10.50
York, Pa.	8.00		90 to 95	2 to 7	10.75
CENTRAL:					
Alton, Ill.	10.90		94.0		
Delaware, O.			61.09	9	9.75
Forest, O.	7.50				
Knowles, Wis.		10.00	55	45	9.50
Manistique, Mich.	10.00@11.00		95	2	12.00@13.00
Marblehead, Ohio			54	16.0	9.75
Mitchell, Ind.	9.00				11.00
Springfield, Ohio			33.62	17.73	10.50
Woodville, Ohio		9.25	47-48	31-32	10.50
SOUTHERN:					
Blowers, Fla.	5.00	7.25	98.0		
Burns, Tenn.	9.00		96	0.54	12.00
Chippewa, Fla.	5.00		80.0	15.0	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	8.00		97.82	0.12	
Karo, Va.	8.00		97.0	1.26	
Lineton, Va.	8.50		97	1.74	
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	5.00		84	1.75	
Newala, Ala.	8.50@9.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	7.50		96.48		
WESTERN:					
Bellins, Wash.					12.00
Colton, Calif.	4.50		97	2	15.00
Lime, Ore.	15.00		91.48	0.58	
Oscas Island, Wash.		5.50			16.50
San Francisco, Calif.					15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands

(Continued from preceding page)

Bridgeton, N. J.—Core	2.00
Cleveland, O.—Molding coarse	2.50
Brass molding	2.50
Molding fine	2.75
Columbus, O.—Core	2.00
Brass molding	2.50
Molding fine, steel molding	2.50
Conneaut, O.—	
Molding fine	2.75@3.00
Molding coarse	2.50@2.75
Eau Claire, Wis.—Core	2.25
Brass molding and sand blast	2.25
Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	2.50
Brass molding	2.75
Molding fine, steel molding	3.00
Molding, coarse	3.00
Sand blast	5.00
Core	2.50
Greenville, Ill.—Molding coarse red	1.60@1.80
Guion, Ark.—Molding fine	2.00@2.25
Roofing	3.00
Stone sawing	2.50
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.85
Klondike and Gray Summit, Mo.—	
Molding fine	2.00@2.50
Mapleton, Pa.—Molding, fine and core, damp	2.00@2.50
Molding, fine, dry	3.00
Massillon, O.—Molding fine	2.50
Molding coarse	2.50
Traction	2.50
Furnace lining	3.00
Core	2.50
Michigan City, Ind.—Core, bank	.50@ .60
Traction	.50
Millington, Ill.—Roofing, stone sawing	2.00
Core and furnace lining	1.75
Core	1.50
Mineral Ridge, O.—Core, molding, sand blast, roofing, brass molding, etc., washed, screened (damp)	2.10
Montoursville, Pa.—Core	1.25@1.50
Traction	1.15@1.35
Brass molding	1.25
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Oregon, Ill.—Core	2.25@2.50
Furnace lining	2.00@2.25
Sand blast	2.75@3.00
Molding fine	2.00
Ottawa, Ill.—Core, furnace lining, molding fine and coarse (washed and dried)	1.75@2.50
Core, furnace lining, molding fine (crude)	.85
Molding coarse (crude)	.75
Roofing line	1.75@3.00
Sand blast	3.00@5.00
Stone sawing	2.50
Traction	1.75@2.50
Brass molding	2.00@2.50
Providence, R. I.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.25
Sand blast	3.00@4.00
Sugar Grove, Ohio—Core (dried and screened)	2.00
Traction	2.00
Thayers, Pa.—Core and traction	1.75@2.00
Furnace lining, molding	1.25
Utica, Pa.—Core	2.00
Molding coarse, traction	2.50
Brass molding	2.75
Sand blast	3.50
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry and screened)	2.50@2.75
Core, furnace lining, molding fine and coarse (green)	2.25
Wedron, Ill.—Core, (crude silica)	.75@1.00
Molding fine, coarse	.75@1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, Ohio—Molding fine and brass	2.00@2.50
Molding coarse	1.75@2.25

Gypsum, per Ton

Castalia, O.—Crushed, to cement mills	3.50
Ground, to cement mills	3.50
Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00 per ton.	
Fort Dodge, Ia., bulk	3.50
Garhutt, N. Y.—Land plaster, bags	7.00
Grand Rapids, Mich.—Crushed gypsum	7.00
Ground gypsum rock	9.00
Gypsumville, Man., Can.	3.50
Oakfield, N. Y.	7.00
Sandusky, O.	6.00

Jute sacks, $3.00 extra; paper, $1.00 extra.

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centreville, Tenn.—B. P. L., 60%	7.00
B. P. L., 60% to 70%	7.00@9.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60%	6.00
B. P. L., 65%	7.00
B. P. L., 70%	8.00@10.00
B. P. L., 75%	12.00
Mt. Pleasant, Tenn.—(B. P. L. 68%)	
13%	7.00
14%	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	10.00
Nichols, Fla.—Pebble, B. P. L., 68%	10.00
Wales, Tenn. (95% thru 100 mesh) (guaranteed 14% phosphorus equivalent)	8.25
Walls, Tenn.—B. P. L., 70.2%—	
To County Agri. Assns.	7.50
To others	7.75

Florida Soft Phosphate

Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Phoslime, Fla. (in burlap bags, 100-200 lbs.)	15.00

General News from Rock Products Markets

Canadian Building Forecast

IN A RECENT interview with Frank Jones, general manager of the Canada Cement Co., Ltd., Montreal, Que., he stated that the mid-winter prospects were very favorable indications of a large year for building and construction work. It is believed that the year 1920 will be much bigger and more prosperous for the Canadian building material interests than 1919.

The large road program will very considerably augment the demand for cement and other road materials. The Canada Cement Co., Ltd., operates plants at Pointe aux Trembles, Que., Longue Point, Que., Hull, Que., Belleville, Ont., Marlbank, Ont., Lakefield, Ont., Port Colburne, Ont., Shallow Lake, Ont., Calgary, Alta., Sandstone, Alta., Exshaw, Alta., Medicine Hat, Alta., Dauntless, Alta., and Winnipeg, Man., and is at present working on some of these in anticipation of a big season which will soon open.

Site of Proposed South Dakota Cement Plant

THE LIME PLANT, the deposit of gypsum, limestone and shale, and the site of the proposed 1,500 bbl. capacity cement plant of the Black Hills Rock Products Co., Rapids City, South Dakota, which was described on page 45 of the January 31 issue of ROCK PRODUCTS, is shown in the accompanying view. The deposit at this place, it is stated, is quite large, well suited to the manufacture of lime and cement and is easily excavated.

Producers, Do Not Establish Season Contract Prices on Material

IN SOME of the larger markets of the state, where dealers are a factor in distribution, producers have been asked to make a contract price to cover an approximation of the season's tonnage requirements.

Every one knows that such contracts are of no value. They merely give the purchaser an option to take whatever quantity of material he may want at a price fixed as maximum for the year. All obligations rest upon the seller. He must furnish requirements, be they greater or less than the quantity estimated at the time of making the contract, thus making it impossible to balance sales with potential production.

Other disadvantages are obvious. Under present conditions, there is no reasonable argument in favor of such an arrangement. All quotations should be for immediate acceptance and subject to change if shipments are not ordered within a given time, except where specific work is involved, when quotations should be limited to a reasonable time after award of contract. Sales contracts should not be made except to cover deliveries of materials to be used on specific work.—Illinois Sand and Gravel Producers' Association Weekly Bulletin.

Chicago Building Supply Men Cleared of Plot Charges

THIRTY-EIGHT building material dealers and producers were found not guilty of criminal conspiracy charges made by the Carpenters' District Council last summer during their strike, when Judge Wells M. Cook of the Chicago municipal court gave his decision in the cases recently.

The carpenters charged that the defendants were in a conspiracy to keep them from obtaining their wage demands from the contractors by closing all building material yards during the strike. Judge Cook ruled otherwise.

Decisions on the cases of about fifty contractors, arrested on the same charges, have not yet been rendered. The prosecution against the dealers and contractors was started during the strike, which was won by the carpenters, who had their wages raised from 80 cents to $1 an hour.

Railroads Will Ask Freight Rate Increase of 20 Per Cent

INFORMATION from a source considered reliable advises that as soon as practicable after the return of the roads the carriers will apply to the Interstate Commerce Commission for a general increase of all class and commodity rates. The measure has not yet been definitely determined, but most likely will be 20 to 25 per cent. It will be proposed to make the advance effective on one day's notice.

Unless sand and gravel producers expect to accept an increase it is absolutely necessary that each knows just what measure of revenue their traffic has paid under the present rates and what will be the effect of any advance that may be suggested.—Ben Stone.

View of the Black Hills Rock Products Co. property

Price Stability Reopens Eastern Construction Activities

Volume of Material Handled During January Will Set a New Mark for New York Market Activities

DEALERS AND MANUFACTURERS of building materials and equipment have become so decided a unit in protest against further general building material price and construction cost increases that owners and architects are relinquishing construction projects that in the recent past have been put aside indefinitely pending more stable cost conditions, says the Dow Service Daily Building Reports.

There are several ways for gauging this change. One is by the volume of materials that have moved out of building material dealers' yards in this city and vicinity to go into actual construction work. The difference between January, 1919, and January, 1920, in the volume of business handled by dealers in New York is more than 870 per cent in the aggregate. The difference between the totals reported for last summer and December is nearly 400 per cent. January reports are not yet compiled, but the percentage is likely to be record-breaking for this time of the year and, February, although temporarily handicapped in deliveries by the storm last week, doubtless will head the list for activity.

Current reports of new building work starting reveal unusual activity. There has been a tendency to take bids on projected new work and then defer the work pending decision on the part of the owner regarding the flow of prices. It is dangerous now, to defer projected buildings, because delivery and manufacturing conditions have heretofore affected prices. Orders have been booked for building materials and supplies at almost any price to get them placed, in the general belief that the consumer will be willing to pay. But the day dawned several months ago when the prospective builder made it evident that he could not, nor would not pay a price beyond the bounds of good business policy, merely to proceed with building plans. Hence the heavy withdrawal of new building and alteration projects in October, November, December and almost all of January.

Today the condition is wholly different. Here is the actual quotation of a certain building material manufacturer, in a trade letter sent to all his customers, the firm being among the largest of its kind doing a national business.

"Present prices are entirely too high. We advise, for the present, against purchasing products unless required for immediate use in actual construction work. Don't try to cover your future requirements. Prices are sure to come down if the trade will heed this note of warning. The time has arrived to apply the brakes."

Various building material associations are circularizing their trades regarding the danger line of building material price inflation. The language of some of these trade letters say that with the 1920 building season barely a month away, the trade is already in the danger zone, unless price inflation can be stopped. Other letters point out the fact that while there is a generous amount of vitally necessary construction work in project that will go ahead regardless of cost, the record-breaking potential construction market that would bring prosperity for half a decade or more, can be narrowed down to a fitful construction era for a year or eighteen months wherein a few big contractors and building material supply firms would flourish, while the general building material and contractural industry would not be as well off as they are today, which is only slightly removed from the stress of war time.

The broadest sentiment in the eastern construction market today is pronouncedly against any limitation to the building market of the future and for the first time in more than a generation there is a unanimity of thought in the building industry that seeks to create a market for the greatest good for the greatest number rather than to foster the sort of a market that will pander only to one certain trade or interest or industry.

The underlying thought in the eastern building industry today is that there easily can be sufficient business for every one for the best part of ten years if trade temptations can be foregone during the remainder of the readjustment period, such as cornering of supply, stampeding prices, hoarding against demand, curtailment of production and "sub" baiting. It is toward this point the building industry is being drawn by dominant leaders and it has the endorsement of financiers, owners, architects, contractors and sub-contractors as well as the best balanced manufacturers.

Canadian Government Road Fund

THE DOMINION GOVERNMENT contemplates the following division of $20,000,000 federal grant for good roads, and of the corresponding $30,000,000 required of the provinces:

	Federal Grant	Provincial Expenditure
Alberta	$1,477,810	$2,216,715
British Columbia	1,251,955	1,877,933
Manitoba	1,602,265	2,403,397
New Brunswick	1,163,845	1,745,767
Nova Scotia	1,468,720	2,203,080
Ontario	5,877,275	8,815,912
Prince Edward Island	603,455	902,183
Quebec	4,748,420	7,122,630
Saskatchewan	1,806,255	2,709,383

A. W. Campbell is Highway Commissioner in charge of work and distribution of grants. This appropriation will be spent during the next five years.

Convention of Material-Handling Machinery Manufacturers

ANNOUNCEMENT is made that the Material Handling Machinery Manufacturers' Association will hold an open convention at the Waldorf-Astoria Hotel, New York City, February 26 and 27. This includes manufacturers of overhead, locomotive, gantry cranes, hoists, winches, portable, gravity and power conveyors, industrial trucks, tractors and trailers, bulk handling machinery, elevators and all forms of equipment and supplies used in the construction and operation of mechanical handling machinery.

Details of the program are being completed and arrangements have been made to hold a morning business session on Friday, February 26, which will be followed by a formal luncheon at the Waldorf-Astoria with prominent speakers, and the afternoon session of the 26th will be devoted to papers and discussions on mechanical handling problems, a number of papers to be illustrated by moving pictures.

On the 27th there will be a continuation of the program covering papers, discussions and a showing of moving pictures, giving views of some of the latest and largest installations.

Anybody interested in the art of mechanical handling, either as a manufacturer or otherwise, is invited to attend the luncheon and the meetings.

Reservations for the luncheon may be procured from Messrs. W. J. L. Banham, Otis Elevator Co., New York City; Chas. A. Rohr, General Electric Co., New York City; Richard Devens, Brown Hoisting Machinery Co., New York City, or from the secretary and manager, Mr. Zenas W. Carter, 35 West Thirty-ninth street, New York City. Price, $4.00.

Passed By The Screens

Incorporations

The **West Penn. Crushed Stone Co.**, West Chester, Pa., has been incorporated with $150,000 capital.

The **Toledo Plaster and Supply Co.**, Toledo, Ohio, has been incorporated with a capital of $500,000. The incorporators are R. L. Witters and others.

The **S. A. Collins Monument Co.**, Reedsburg, Wis., has been incorporated with a capital of $25,000 for the purpose of manufacturing and selling stones, cement work and stone work. The incorporators are S. A. Collins, T. W. Collins and E. M. Collins.

The **Inter-City Granite and Marble Works**, Sauk City, Wis., has been incorporated with a capital of $7,500 for the purpose of manufacturing and the sale of monumental and building stones. The incorporators are J. H. Hill, Carl Pulvermacher and A. R. Kahn.

The **Wausau Sand and Gravel Co.**, Wausau, Wis., has been incorporated under the laws of the state of Wisconsin, for the purpose of dealing in commercial sand and gravel. The capital is $25,000 and the incorporators are T. J. Schott, A. C. Heinzen and W. A. Cramer.

John Vokes & Son, Ltd., Toronto, Can., has been incorporated by John Vokes, Victor V. Vokes, stone merchants, and others, with a capital of $50,000 to take over as a going concern the stone business formerly carried on by John Vokes.

The **Tractor City Sand and Gravel Co.**, Janesville, Wis., has been incorporated for the purpose of marketing sand and gravel and the manufacturing and sale of sand, gravel and cement products, etc. The capital is $60,000 and the incorporators are O. G. Olsen and Fred H. Howe.

The **Alabama Lime Works**, Fort Payne, Ala., has been incorporated under the laws of the state of Alabama. The president and general manager of the new company is J. J. Farnsworth. Equipment to the value of $20,000, including four lime kilns, will be installed.

The **Southern Phosphate Corporation** has just been formed under Delaware laws with 300,000 shares of common stock, having no par value. The company will sell 94,696 shares for cash—$26 a share—to finance the purchase of properties and to provide $650,000 working capital. The lands of the Southern company contain over 11,000,000 tons of high and standard grade phosphate rock, while this tonnage will be doubled should the company acquire other property under option. O. T. Ridenour, Boston, Mass., is president of the company.

The **Houston Gravel Co.**, Houston, Texas, has been incorporated with a capital of $10,000. The incorporators are H. L. Warren, J. L. Townsend and James Shelton.

Personals

Hugh L. Siegel, formerly general sales manager for the Ford Roofing Products Co., is now with Walter A. Zelnicker Supply Co., St. Louis, Mo., as assistant to the president.

G. B. Livingood, who for the past two years has been connected with the engineering sales forces of the Traylor Engineering & Manufacturing Co., Allentown, Pa., has been appointed assistant sales manager of the mining and crushing department.

E. A. Craig, who has been associated with the Westinghouse Air Brake Co., Wilmerding, Pa., 22 years, has been given charge of the export department which has recently been created. Mr. Craig began his career with the company in 1888. In 1905 he was appointed as auditor and assistant secretary and in 1906 was made southeastern manager. The new department will be represented in the New York office by W. G. Kaylor, and in South America by R. M. Oates.

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Plants For Sale

FOR SALE, LEASE OR RENT

A fully equipped crushed rock and lime plant with highest testing blue limestone in southern Ohio, testing 94.20% Calcium Carbonate. Fine location for a large lime or cement plant. Fifty acres of a forty-foot ledge of stone with light stripping. Plant has been in operation for five years with increasing demands and good results. Am retiring from business on account of health. For further information, call on or address

FRANK SHARP
LYNCHBURG, - - - - OHIO

Granite Quarry for Lease

Located at mouth of Susquehanna River and head of Chesapeake Bay in Maryland near Perryville. Sidings in quarry connecting with all Pennsylvania and B. & O. railroads, and deep water landing nearby and leased with quarry. Granite of good strength and quality, suitable for building, Belgian blocks, ballast and road work.

H. ARTHUR STUMP, OWNER,
1034 Calvert St. Baltimore, Md.

Plants For Sale

FOR SALE

Crusher Stone Property for sale in Southern Indiana. Plenty of stone. Good siding connections on good railroad. A Number 5 crushing plant with limestone grinder, and fine prospects for 1920 business. Good reasons for selling. Address

Box 1350 Care of Rock Products

FOR SALE

Large deposit of silica, 98 per cent; good place for silica brick plant; 10 miles from Bethlehem steel plant. Will sell cheap. For information write

A. C. RAPP, R. R. No. 1, Milford, N. J.

Plants For Sale

RARE OPPORTUNITY

A very choice tract of White Silica Sand Land, for sale, in the Ottawa, Illinois, district. Best of railroad facilities. Ninety foot vein; 99 per cent pure. Very light stripping. Enough said. Address,

Box 1359 Care of Rock Products

Situation Wanted

POSITION WANTED

Young man, single, technical education, with eight years' practical experience in stone plants and stone quarries, wants to secure position with up-to-date and well-financed quarry operating firm. The writer has had five years' experience in the capacity of superintendent and general superintendent of plants; has purchased, set up and operated all kinds of crushing machinery and equipment, and has handled large forces of American and foreign laborers. Has installed and supervised cost accounting systems, and has succeeded in reducing mechanical breakdowns and in operating plants efficiently. Will appreciate an interview and can furnish satisfactory references and recommendations. Address

Box 1364 Care of Rock Products

SITUATION WANTED

Superintendent desires engagement where thorough knowledge of operation is essential for economical production; thorough knowledge of heavy blasting and efficient upkeep of machinery. References. Address

Box 1351 Care of Rock Products

CLASSIFIED ADVERTISING

Help Wanted

Night Superintendent for Cement Plant Wanted

Good salary; splendid opportunity for advancement. State experience, age and nationality. Give reference. Address

Box 1368 **Care Rock Products**

WANTED

A Quarry Foreman capable of handling large Quarry operation involving the use of steam shovels, dragline, etc. Want a man who is thoroughly capable of handling men, supervising track work and getting results. In applying, state age, experience and salary expected. Address

Box 1374 **Care of Rock Products**

Help Wanted

WANTED

Experienced brick manufacturer to take charge of a brick plant. Going concern making very high-grade brick. Will only consider a party who can take a part interest in plant. Good salary and reasonable amount of stock given to right party. This is an opportunity for development. Plant has an everlasting supply of high-grade shale and a permanent market established for its product. Anyone answering this inquiry must state past experience and advise just when they could take charge. Address inquiry to

Box 1361 **Care of Rock Products**

Wanted

Reliable young man with few thousand dollars, willing to take interest in established Lime Manufacturing and Stone business; capable of assuming management, both sales and production, with salary. No trifler need apply. Give full particulars. Reply

Box 1371 **Care of Rock Products**

Help Wanted

Wanted

Two Agricultural Limestone Salesmen for Central California. Address

KAWEAH LIME PRODUCTS CO.,
302 Cory Bldg. **Fresno, Cal.**

WANTED

An experienced quarry foreman familiar with operation of steam shovels and large crushers. Permanent position for right party. State experience and furnish reference. Advise salary expected. Address

Box 1362 **Care of Rock Products**

WANTED–SALES ENGINEER

to sell line of quarry and rock crushing equipment. Must be experienced in selling and competent to handle plant layouts. Address

Box 1366 **Care of Rock Products**

USED EQUIPMENT

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

FOR SALE

SAND AND GRAVEL PUMPING OUTFIT—complete, consisting of 10-inch Morris Pump, direct connected to 9"x9" Double Engines; 125 H. P. Boiler; Dake one-drum Hoist. All in splendid condition and priced right. Are installing electric power.

The Lincoln Sand and Gravel Co.
Lincoln, Illinois

WANTED

Everyone who has a truck will be interested in our free booklet, "Truck Tire Insurance." It tells how Giant Trip Traction Equipment makes trucks 100% efficient. We want you to write for it today.

CHALLONER COMPANY, Dept. T 19
Oshkosh, Wis.

FOR SALE

One Thew Automatic Steam Shovel, Model "O," No. 617, in first-class condition; can be inspected under operation.

Thomasville Stone & Lime Co.
Thomasville, Pa.

10K GATES

Manganese fitted, regular drive. $6,000. Elevator, $1,400. 50-ft. center. Practically new. Immediate delivery.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

WANTED

Quarry enlarging its capacity wants to buy:
1—Large Jaw Crusher, 1000 to 2000 tons in 10 hours.
2—No. 5 or No. 6 Gyratory Crushers.
2—¾-yd. or 1-yd. Steam Shovels.
1—Keystone Excavator.
1—Blast Hole Well Drill.
1—70-ft. Elevator, 30 or 36-in. buckets.
1—60-in. Screen, 26 to 30 ft. long.
1—Hammer Mill Pulverizer.
20-lb. Rails.
2-ton to 3-ton Dump Cars.

Give full particulars—State lowest cash price.

Box 1373 **Care of Rock Products**

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

USED EQUIPMENT

Machinery for Sale

by

BUFFALO SLAG COMPANY
1070 Ellicott Square
BUFFALO, N. Y.

1—35 H. P. 230 Volt D. C. General Electric Motor. Speed 600 R. P. M., equipped with pulley 9″ dia., 12″ face.

Price—$500.00, F. O. B. Buffalo, N. Y.

1—No. 6-D Gates gyratory crusher, Shop No. 4502, in good operating condition. Regular drive.

Price—$2500.00, F. O. B. Buffalo, N. Y.

1—Open end rotary screen, 72″ diameter by 16′ long. Complete with perforated plate screen sections and jacket. Steel frame. Extra well built.

Price—$1500.00, F. O. B. Buffalo, N. Y.

1—Size 10½″ cross compound steam driven Westinghouse air compressor. Capacity, 150 cu. ft. per minute. Specially adapted for mounting on steam shovel.

Price—$300.00, F. O. B. Emporium, Pa.

1—Power Brick Press for making concrete brick. Capacity, 1400 per hour.

Price—$750.00, F. O. B. Buffalo, N. Y.

What Do You Need in PUMPS ?

The Du Pont Chemical Co. has a surplus of about 1500 Pumps of various types and capacities. Standard makes — Worthington, Gould, Allis-Chalmers, Blake & Knowles, American Well Works, Douglas Lea Snow, Pusey & Jones, Rumsey, Kutztown Foundry and Machine, Connorsville Blower, and others.

Duplex, Compound, Hydraulic, Fan or Enclosed type impeller. Centrifugal, rotary, vacuum, triplex and diaphragm. High or low pressure, bronze fitted or all iron.

All are in usable condition and Ready for Immediate Delivery

We have the pump you need. Nowhere else will you find such a complete assortment. Tell us what kind of a pump you want and for what it is to be used. Return mail will bring quotations that will save money for you.

DU PONT CHEMICAL CO.
Incorporated
Wilmington, Delaware

FOR SALE

150—Elevator buckets, ten gauge steel 24″ x10″x13½″ for 26″ elevator. These buckets are warranted to be in first class second-hand condition and are offered for sale because no longer needed, our method of elevating material having been changed to belt conveyor.

THE CARMICHAEL GRAVEL COMPANY
Williamsport, Ind. St. Louis, Mo.

FOR SALE
12 Ton Baldwin Locomotive

Thoroughly overhauled at their works. Has new boiler. Too light for our requirements. Available at once. Address

Box 1367 Care Rock Products

FOR SALE

1—NO. 10K GATES MANG. FITTED.
1—No. 4 crushing plant, motor drive.
20—Crushers, Nos. 2 to 10, mostly Gates.
1—327 HP. W. T. Boiler. $9.50 HP.
9—150 HP. 125 lb. H.R.T. boilers, butt strap.
2—48″x12′ Taylor Manganese screens.
25—Air compressors, 60 to 4000 cu. ft.
50—Steam engines, 30 to 1500 HP.
1—95 HP. Loco. type boiler. Ill. ship.
75—Steam and Centrifugal Pumps.
1—30-60 HP. Emerson-Brantingham tractor.
Concrete mixers—Contractors Equip.
Send us your inquiries for electrical equip., engines, hoists.

Ross Power Equipment Co.
Indianapolis, Ind.

QUARRY OUTFIT FOR SALE

Consisting of derricks, horsepower, one stone saw gang, one stone planer machine and various tools for quarrying. Address

P. J. NORTON
Cottonwood Falls, Kansas

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

WANTED

A large size second Jaw Crusher, also elevator and screen. State condition and lowest cash price.

B. F. Pope, Law Bldg., Baltimore, Md.

FOR SALE BY

WILLIAM KRAETZ, 712 Ellicott Sq., Buffalo, N.Y.

Ready for immediate delivery, all practically good as new, subject to prior sale. Located Buffalo, N. Y.

BOILERS

2—200-hp. Atlas water tube.
1—450-hp. B. & W. Boilers.
4—500 hp. B. & W. Boilers.

ENGINES, MOTORS, GENERATORS

1—26 x 48 Hamilton-Corliss engine, 87 rpm.; fly wheel, 48-in. face, 17-ft. diameter.
1—Westinghouse Generator, 200 Kw., 250-v., 225 rpm., with "Skinner Engine" attached; also a 3-panel switchboard complete.

PUMPS

1—7-in. x 4-in. x 8-in. Buffalo steam.
1—7-in. x 6¾-in. x 8-in. Buffalo steam.
1—8-in. x 9-in. x 9-in. Buffalo steam.
1—10-in. x 6-in. x 12-in. Dean steam.
1—10-in. x 8-in. x 10-in. Worthington steam.
1—2½-in. x 2-in. Buffalo class "C" rotary.
1—4-in. x 5-in. Buffalo rotary.
1—5-in. x 6-in. x 6-in. Burnham vacuum, steam.
1—8-in. x 8-in. x 12-in. Dean, vacuum, steam.
1—Triplex pump, motor attached, 2-hp., 220-v., 9½ ampere, 600 rpm., D.C.

STONE HOUSE

40-ft. Chain bucket belt, elevator buckets, 16-in. x 9-in. x 8-in., with shafting, pulleys, etc.
75-ft. drag conveyor, equipped with 24-in. x 12-in. paddles, shafting, sprockets, etc.
15-ft. 18-in. Belt Conveyor and equipment.
20-ft. 12-in. Belt Conveyor and equipment.
40-ft. Chain Bucket and Elevator and Steel Housing Buckets, 7-in. x 5-in. x 5-in.

STONE CRUSHERS

1—No. 3 Austin gyratory.
1—No. 4 Austin gyratory.
1—Mosser crusher.

BELTING

124 ft. 18-in. Scandinavia.
62-ft. 24-in. Scandinavia.
64-ft. 4-in. Red Canvas.

MILLS

1—No. 7 Kent with separator and accessories as follows:
30 feet, 12-in. cut flight, L. H. screw conveyor.
12 feet, No. 10 Standard R. H. screw conveyor.
30 feet, Bucket elevator and steel housing, 5-in. x 8-in., buckets attached.
40 feet, chain bucket elevator and steel housing, 14-in. x 6-in. x 8-in., buckets attached.
3—Allis-Chalmers tube mills, 5½ x 22-ft., equipped with Blevney clutches attached to 7-ft. x 18-in. pulleys.
1—Schmidt tube mill, 5½ x 22-ft., with Hill clutch attached to 7 x 12-in. pulley, with following accessories:
220-ft. 12-in. R. H. Standard screw conveyor.
40-ft. Belt bucket elevator and housing, 5-in. x 18-in. buckets attached.

CEMENT STOCK HOUSE

60-ft. R. H. 12 Screw Conveyor.
40-ft. L. H. 12 Screw Conveyor with sprocket chains, belting, shafting, etc., for above.

FURNACE ROOM EQUIPMENT

1—Traylor Furnace.
1—No. 30 U-Pipe, Traylor hot stove.
6—10 cu. ft. charging burrows.
3—Thwing recording pyrometers.
1—Indicating pyrometer.
1—Sarco Co. recorder.
1—Root blower.
1—Buffalo Forge Co. 3500 cu. ft. Fan.

MISCELLANEOUS

1—500-lb. Fairbanks Scale.
1—1000-lb. Fairbanks Scale.
2—Fairbanks Charging Scales.
1—Large steam trap.
2—Steel Tanks, 10-ft. x 5-ft. x 5-ft.
1—Jib Crane with steam hoist and engine attached.
1—Double Cage Otis Electric Elevator.
1—Tolhurst Centrifugal Dryer.
1—Double Effect Evaporator.
3—8 x 10 Cypress Tanks.
1—Portable Electric Hoist, 2-ton capacity with d.c. motor attached.
1—50-ft. Belt Conveyor and equipment.
1—30-ft. Chain Bucket Elevator with steel housing and buckets attached.

GRANULATOR HOUSE

1—Cooling Table Conveyor.
1—Granulator housing and equipment, 15-ft. 12-in. Steel Drag Conveyor.
3—Cast Iron Ladles.

STONE CRUSHERS

We are headquarters for good, modern "used" machinery of this character, buying and selling

GYRATORY CRUSHERS
JAW CRUSHERS
CRUSHING ROLLS
DISC MACHINES
PULVERIZERS, ETC.

Also Steam Shovels, Cranes, Locomotives, Cars, Rails, Air Compressors, Cableways, Road Building Machinery, etc.

Wm. B. Grimshaw Co., 1048 Drexel Bldg., Phila., Pa.

Dealers in USED but NOT ABUSED Machinery

FOR SALE

On account of changing our power plant from steam to electricity we offer for immediate delivery:

1—25 H. P. Semi Diesel type Y special electric Fairbanks Morse Fuel Oil Engine. Operated only 4 months driving 3" pump. Condition good as new.

1—Fuel Oil Tank steel, 24" x 10', capacity 235 gallons.

1—50 H. P. Rice Automatic Steam Engine, cylinder 9" x 16". Now being overhauled.

1—Link Belt (Dull automatic) 60" conical sand separator complete with scale beam levers and counter weights. Used 4 months.

J. E. CARROLL SAND CO.
907 White Bldg. Buffalo, N. Y.

WANTED

Newago Screens or similar make.

THE ATLAS COMPANY
KEMPTON, PA.

WANTED

No. 7½ gyratory crusher, second-hand; also elevator and screens. State condition and lowest cash price.

Box 1372 Care of Rock Products

MACHINERY FOR SALE

One 5x3½-ft. and two 6x6-ft. Smidt kominuters.
Three Emerick 10-ft. separators.
Three 33-in. Fuller-Lehigh mills.
Also a lot of kilns, dryers, crushers, tube and ball mills.

W. P. HEINEKEN, Engineer, 95 Liberty Street, New York City

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos. 1999, 2059

1—Model 28 Marion, full revolving, ⅝ yd. dipper.

Hoisting Engines

1—8½ x 10 DC 2-D Lambert, with boiler

1—6 x 10" DC 2-D Byers.

1—6¼ x 10 DC 2-D Mundy, with attached swinger and boiler

Cableway

1—Lidgerwood Cableway, 1164-ft. span, with 9 x 10" DC Reversible Link Motion Cableway Engine, 3-ton capacity

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Locomotives

1—3-ton Fate gasoline locomotive, 36" gauge.

1—14 x 20" standard gauge saddle tank Locomotive.

2—American 10 x 16" Locomotives, 36" gauge, with butt joint boilers

4—18-ton 10 x 16" Dinkeys, 36" gauge

Clam Shell Buckets

1—1½-yard Browning.

Cars

20—12-yard Western Air Dump, standard gauge, 26 ft. bed.

26—12-yard Western air-dump standard gauge cars, 19' bed.

H. KLEINHANS COMPANY

Union Arcade **Pittsburgh, Pa.**

FOR SALE—IMMEDIATE DELIVERY

12" HEAVY DUTY MORRIS DREDGING PUMP directly connected to 11"x10" DOUBLE ENGINE

with enclosed double steady and thrust bearing running in oil bath; all mounted on rugged cast iron base; a complete self-contained unit

Pump Shell 3" Thick, Crank Shaft and Pump Shaft 5" Dia., Weight of Unit Approximately 11 Tons

With 185 boiler horsepower and 100 lbs. steam at throttle will deliver **250 TONS** of loose sand and gravel in an hour to a vertical height of 35 ft. above the water level in which the dredge floats.

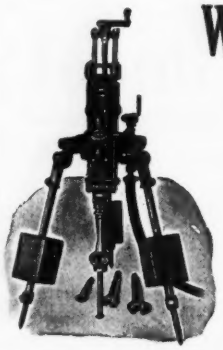
Under same conditions will deliver **150 TONS** an hour through 500 ft. of 12-in. pipe to an elevation of 10 ft. above the water level in which the dredge floats, where the percentage of large gravel is not excessive.

Clearances through pump will allow passage of objects up to 9 inches in size

This unit has been operated a total of 10 hours as a test period to comply with builder's guarantee, and in that time pumped 3,000 cu. yds. of sand and gravel.

PIERCE J. McAULIFFE

55 Liberty Street **New York City**



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Paterson, N. J.

Rock Drills *and* Hammer Drills

All Sizes
And for All Purposes

WEBSTER

Elevating and Conveying Machinery

For rock, ore, coal and grain handling and for the movement of materials in bulk or packed. Literature and engineering estimates on request.

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NEW YORK BOSTON CHICAGO

BACON~FARREL ORE & ROCK CRUSHING~WORLD KNOWN ROLLS~CRUSHERS

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IT WILL PAY YOU TO GET OUR PROPOSITION BEFORE YOU BUY

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MAIN OFFICE AND WORKS

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SCREENS of All Kinds

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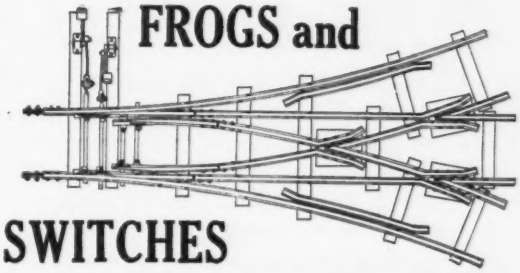
2445 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

FROGS and SWITCHES



The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

PORTER LOCOMOTIVES
STEAM & COMPRESSED AIR
WRITE FOR CATALOGUE
H.K. PORTER Co.
Pittsburgh, Pa.

We Design and Equip Complete Plants

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.
Engineers, Machinists and Founders
Enterprise, Kansas

When in the market for machinery or equipment, look through the advertisements of ROCK PRODUCTS. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our readers. Use it.

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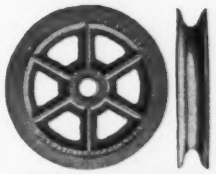
The Nation's Business Magazine of the Rock Products Industry
542 So. Dearborn St. Chicago, Illinois



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THE INTERRUPTION
INCREASE
THE PRODUCTION
of Your Plant By Installing
SUPERIOR NON-ROP-WER SHEAVES

They reduce rope wear to a minimum. Save power and insure safety. *Increases Hoisting Efficiency.* They cost no more than ordinary sheaves. Write for booklet today.

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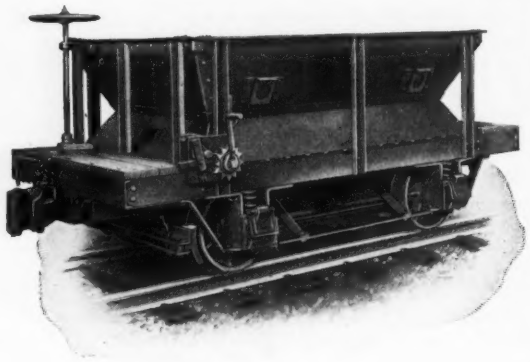

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WATT CARS

We have devoted years to the study of cars for your requirements, and now offer free our engineers' expert judgment in solving your problems.

CARS—every type—that's all we make.

The Watt Mining Car Wheel Co.
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First National Bank Building
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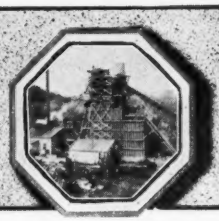

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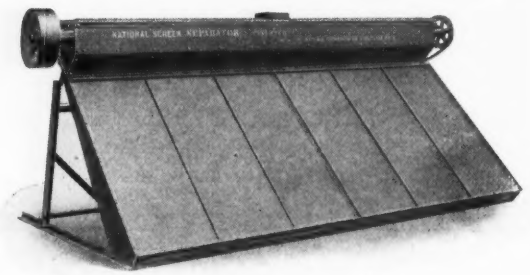
What we have done in putting other plants on an efficient, paying basis we can do for yours. Details are ready for your consideration.

Examinations, appraisals and reports made for purposes of finance and income tax returns.

We are prepared to finance meritorious properties.

NATIONAL
Screen Separator



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Efficiency
Durability
Simplicity
Capacity

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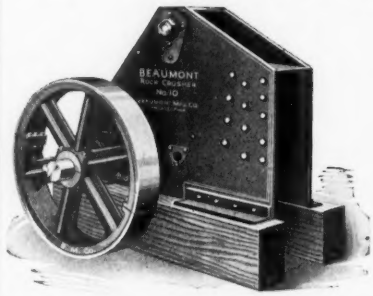
BEAUMONT ROCK CRUSHERS



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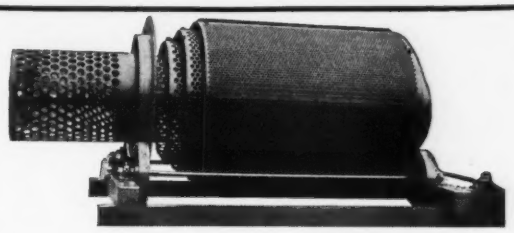
Made to Fit All Makes and Sizes of Revolving Screens



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Sand and Gravel Screens

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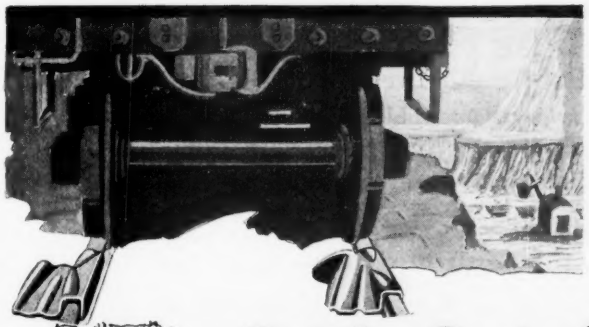
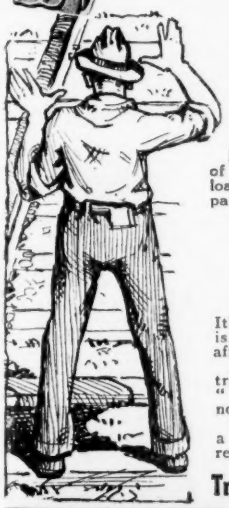
CONICAL SCREENS
EVERYTHING IN SCREENS
QUICK SHIPMENTS

Johnston & Chapman Co., 2921 Carroll Ave. CHICAGO





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FOWLER Car Replacers

It's plain as "two and tow is four." The cost is so mush less to be prepared that you can't afford to be without a set another day.

Lay Fowler Pressed Steel Replacers on the track. A tug or push on the "drag" and "bingo!" things are moving. No spikes—no time lost.

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Track Equipment Company, Huntington, W. Va.

Universal Crushers

The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy!

Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

Universal Crusher Co.
225 Third Street
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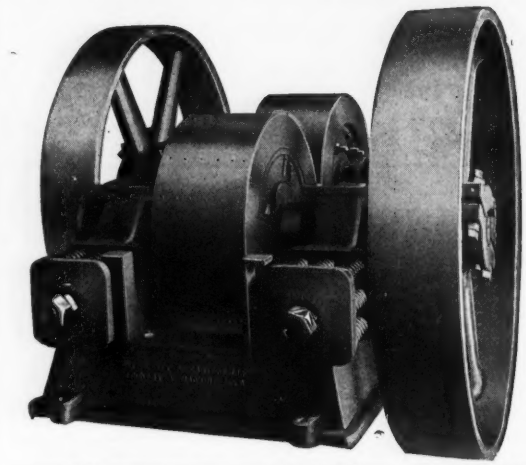

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WEBB CITY, MISSOURI

Perforated Metal Screens
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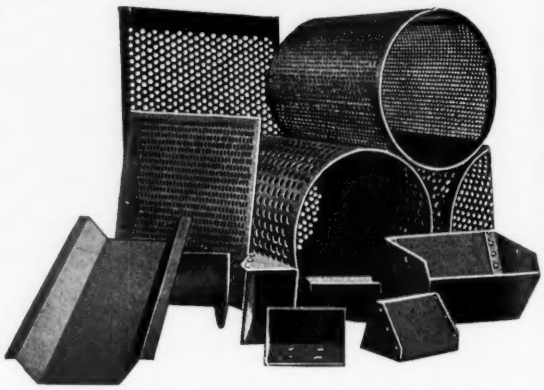

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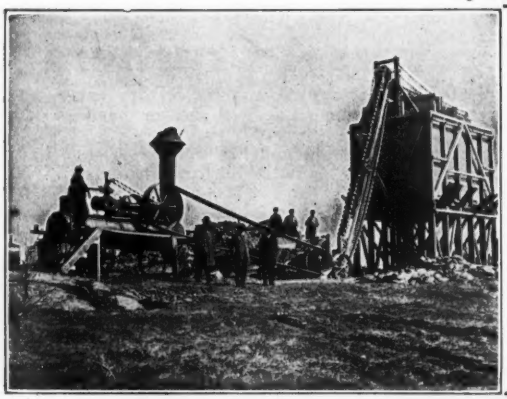
Hendrick Mfg. Co.
CARBONDALE, PA.
New York Office, 30 Church Street



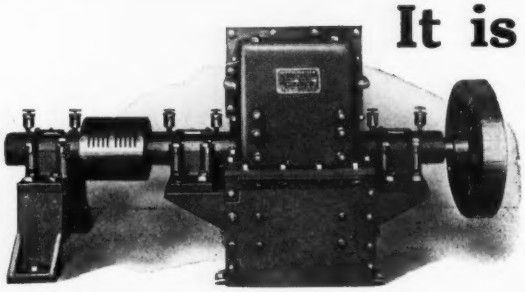
COMPLETE INSTALLATIONS
For Stone Quarries or Lime Plants

We are prepared to build and superintend the installation of all equipment necessary to start operations.

Reliance Products are equal to the best and we know that our engineers can save you money by their recommendations. Prompt deliveries.

Let Us Quote You Prices

Universal Road Machinery Co.
Kingston, N. Y.
Reliance Quarry and Road Building Equipment



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that whatever you want to crush there's a "K-B" for the job. Let us tell you what the

K-B PULVERIZER

is doing to solve crushing problems similar to your own. Uses less power and built to last.

Ask us for facts and figures.

K-B PULVERIZER COMPANY, Inc., 92 Lafayette St. NEW YORK

K-B PULVERIZER

"WE have in the past operated other shovels that are good, but the ERIE is the best, being by far the most substantial. Our first ERIE has been digging and loading hard gravel for three years without any repairs, although we have worn out a dipper."—(*Signed*) *N. H. Battjes, President, STANDARD BUILDERS' SUPPLY CO., Grand Rapids, Mich.*

The ERIE is the RELIABLE shovel, and gives steady service in the hardest digging.

Investigate carefully. Get all of the facts. Pick out the best steam-shovel.

We will be glad to send you our Bulletin P. Write for it. Address:

BALL ENGINE CO., Erie, Pa.
Builders of ERIE Steam-Shovels and Locomotive Cranes; BALL Engines

"Nothing for repairs in three years"

ERIE Revolving Shovels BALL Engine Co. Erie, Pa.

CROSS ENGINEERING CO. CARBONDALE, PA. PERFORATED SHEET METALS

PERFORATED STEEL SCREENS

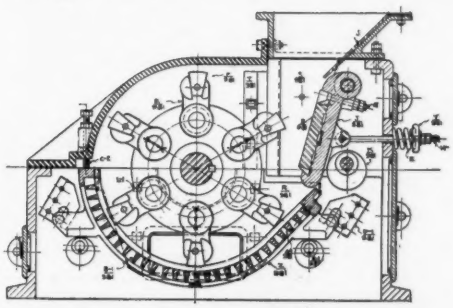
The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge, and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pennsylvania

THE KENNEDY
Swing-Hammer Pulverizer



A Mechanically Perfect Device

The Kennedy Swing-Hammer Pulverizer embodies mechanical improvements heretofore considered unattainable. Reversible, renewable hammer tips and breaker plates of alloy steel. Impact pulverizing—no grinding movement. Adjustable steel grid—so controlled as to permit adjustment while machine is running. Automatic lubrication. Ball and socket bearings—in short, every possible improvement tending toward efficiency, durability and low maintenance expense.

Send for full description

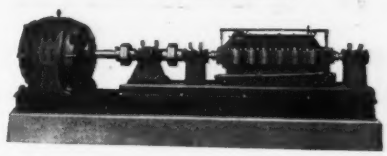
Kennedy Van Saun Mfg. & Eng. Corp.

"Vickers, Ltd., Vickers House, Westminster, London, England, licensed manufacturers for Great Britain and colonies."

120 Broadway **New York**

AMERICAN
TRADE MARK REG. U.S. PAT. OFFICE.
CENTRIFUGAL AND DEEP WELL PLUNGER
PUMPS

Service—Dependability and Durability



Built in all practical types and sizes to meet standard requirements for horizontal or vertical centrifugal or deep well plunger pumps. Furnished for direct connection or any desired drive—electric motor, steam, chain, belt or gear.

There is half a century of specialization and a rigid guarantee back of every American pump sold.

Catalog 149 describes American Centrifugal Pumps. Catalog 130A describes Deep Well Plunger Pumps. Sent to you on request.

THE AMERICAN WELL WORKS
General Offices and Works: Aurora, Ill.
Chicago Office: First National Bank Building

Note These Please!

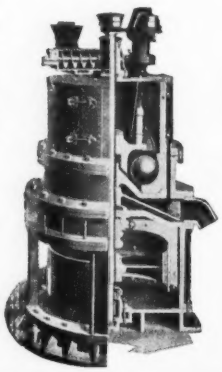
Points of superior merit guarantee economical operation of the Fuller Lehigh

Pulverizer Mill

They are unequalled for producing

Agricultural Limestone

Reduces lump rock to 20, 40, 60, 80, 100 or 200 mesh. Requires no outside accessory equipment. Requires no overhead shafts, drives or screens. All material discharged from mill is finished product. No inside journals or bearings. No inside lubrication. Uniform feeding system. Constant and free discharge. Low installation cost. Low operating cost. Low lubricating cost. Dustless operation. Built in sizes to meet the requirements of your trade. Grinds rock to meet the specifications of all Agricultural Experiment Stations.



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Fuller-Lehigh Company

MAIN OFFICE AND WORKS:

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Branches: New York City, 50 Church St. First National Bank Bldg., Parsons, Kans. 719 Sheldon Building, San Francisco 714 L. C. Smith Building, Seattle, Wash. 1336 McCormick Building, Chicago, Ill. 25 Victoria St., Westminster, S. W. I., London, England. Germany, Hamburg, 1, "Wallhof," Glockengiesserwall 2.

CALDWELL Belt Conveyors

Simple—Economical

will solve your handling problem. Simple in design, economical of power, they give the utmost satisfaction. Our forty years' experience has made us thoroughly familiar with the many details of construction necessary to success.

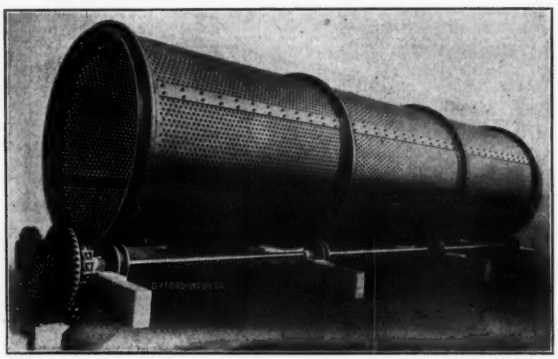
A rough sketch showing the conditions to be met at your plant will bring our recommendations. We should also know the capacity desired and the power available.

Get Catalog No. 38

H. W. Caldwell & Son Co.

Elevating, Conveying and Power Transmitting Machinery

Chicago 17th Street and Western Avenue — 50 Church Street New York, N. Y.



Screens of All Kinds Also Conveying Machinery

for handling Crushed Stone, Gravel, Sand, Clinker and like materials.

You are invited to ask our cooperation at any time—preferably RIGHT NOW! Just sketch your problem briefly and you shall have a money-saving plan submitted you at once.

Catalogs mailed on request

Gifford-Wood Co.

HUDSON, N. Y.

New York Boston Buffalo Philadelphia Chicago

LOCOMOTIVE CRANES
CLAM SHELL BUCKETS - SHIPBUILDING CRANES
CAR DUMPERS PILE DRIVERS
THE McMYLER INTERSTATE CO.
CLEVELAND OHIO

A CRANE WITH A RECORD FOR SPEED

A McMyler Interstate Type "B" Crane, equipped with a McMyler Interstate Clam-Shell Bucket, made a record of 13 trips in 3 minutes, swinging at 90° each trip. The speed is important, but the fact that the crane will stand up under continuous service such as this is more important. The first cost of a crane is of little importance if a large percentage of return is insured. Greater speed, consequent greater capacity, together with low maintenance cost, make the Type "B" one of the best "buys" on the market.

The McMyler Interstate Co., Cleveland, O.

BRANCH OFFICES:

New York—1760 Hudson Terminal Bldg. Seattle ——— Hoge Bldg.
San Francisco—Merchants Exchange Bldg. Denver ——— 18th and Wazee Streets
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Perforated Metal Screens
MADE TO SUIT YOUR REQUIREMENTS

It is easy to understand why Nortmann-Duffke Screens have become identified in this country and abroad as extraordinarily good. The reason is simply the ability to remain at their best for years without the need of expert attention.

Mill superintendents know this unusual quality means uninterrupted performance.

Let Us Quote You Prices

NORTMANN DUFFKE CO.
1200 27th Avenue MILWAUKEE, WIS.

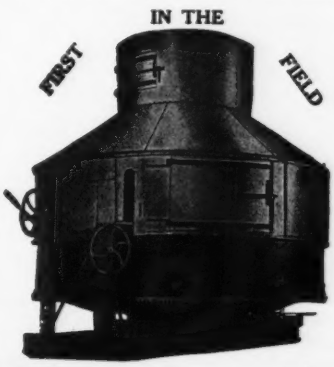
The Clyde Lime Hydrator Performance Counts

The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate, and most economical in cost of installing, maintaining and operating.



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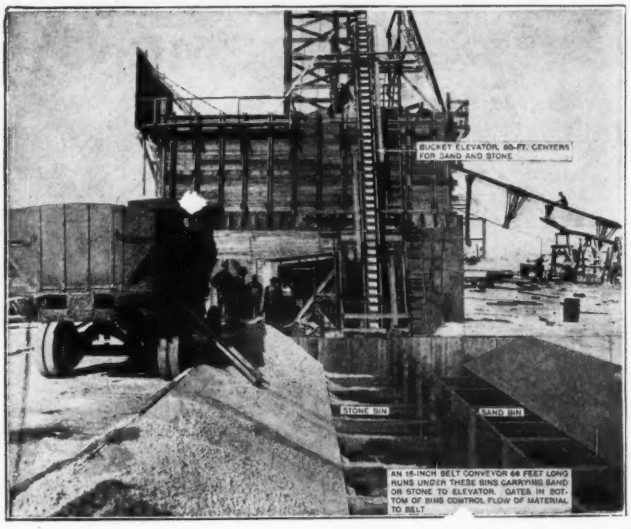
Patentee and Sole Manufacturer
DULUTH - - MINNESOTA

Weller Labor Saving Equipment


BUCKET ELEVATOR, 60-FT. CENTERS FOR SAND AND STONE
STONE BIN
SAND BIN
AN 18-INCH BELT CONVEYOR 66 FEET LONG RUNS UNDER THESE BINS CARRYING SAND OR STONE TO ELEVATOR. GATES IN BOTTOM OF BINS CONTROL FLOW OF MATERIAL TO BELT

WELLER MADE CHICAGO

For Handling

Concrete Aggregates

Weller's Unit Storage System and Equipments by replacing man power in the handling of sand, gravel, crushed stone, cement, etc., between wagons or cars, and the mixer, are solving the labor problem, expediting the work and reducing construction costs for contractors and materials producers throughout the country.

Submit your problem. Experienced engineers at our home or any branch office will gladly aid you in its solution.

WELLER MFG. CO.
CHICAGO

NEW YORK CITY PHILADELPHIA BOSTON SALT LAKE CITY PITTSBURGH BALTIMORE

AUDUBON WIRE CLOTH CO., INC.

Quality, Service, Satisfaction *Guaranteed*

by manufacturers who know how—as we have specialized in our facilities and equipment for caring for the special requirements of industrial users of wire cloth in the full technical meaning of your requirements.

Can you appreciate this statement?

Therefore it will pay you to get

OUR SERVICE
OUR PRODUCTS
OUR DELIVERIES
OUR PRICES

which demands

YOUR SATISFACTION
QUALITY, EFFICIENCY
AND UNIFORMNESS
OF YOUR PRODUCT

LET US CO-OPERATE WITH YOU

Audubon Wire Cloth Co., Inc.

Manufacturers of

Wire Cloth and Screening in all sizes and meshes, made of Iron, Steel, Brass, Copper, Galvanized and Special Metals. Rock, Crushed Stone, Sand and Ore Screens. All grades Sieves and Riddles. Factory and General Offices—

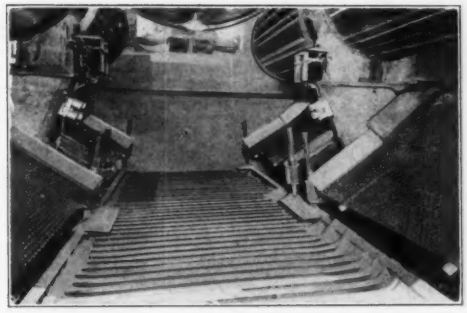
AUDUBON, N. J.

4 Miles from Philadelphia, Pa.

AUDUBON, N. J.

The Mitchell Electric

Vibrating Screen



—delivers more than 1200 tons per 24 hours of minus ½" material

The Mitchell Electric Vibrating Screen can classify at less cost far greater quantity of material in a given length of time with a given capacity than any other screen made.

The following capacities daily delivered by the Mitchell in one of the world's largest ore concentrating mills, bear out this statement:

In coarse crushing work each Mitchell screen is delivering a screened product of more than 1200 tons per 24 hours of minus ½-inch material. In fine crushing, dry work, each Mitchell is delivering a screened product of more than 700 tons per 24 hours of minus 10-mesh material. In fine crushing, wet work, each Mitchell is delivering a screened product of more than 750 tons per 24 hours of minus 10-mesh material.

Send for our booklet giving full description of the Mitchell

Manufacturers and Sole Agents **Stimpson Equipment Co.,** **315 Felt Bldg., Salt Lake City**

MORRIS SAND PUMPS

The illustration below shows our standard sand pump arranged for steam engine drive. This pump is also furnished for direct connection to motor and for belt drive.

HYDRAULIC suction dredging is the most economical means of handling sand and gravel. It not only raises the material but delivers it to a desired point all in one operation. And Morris Pumps function with a very minimum of power; with inconsiderable repairs; with an endless amount of mechanical enthusiasm.

About Their Builders:

We have built centrifugal pumps for over 55 years and have produced over 60,000 in all types and sizes.

The Morris shops are equipped with the most modern tools and we are prepared to build any size of belt-driven or directly connected pumps.

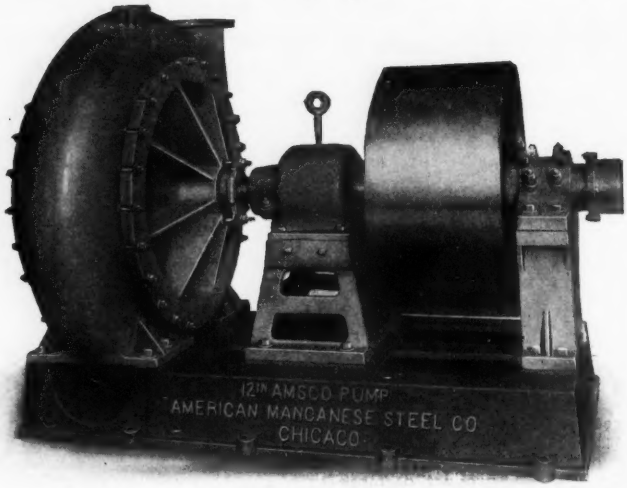
Want to Know More About Pumping? Get Our Bulletin No. 19B. Write Now!

Morris Machine Works

BALDWINSVILLE, N. Y.

Branches in all principal cities

AMSCO SAND AND GRAVEL PUMPS



Are Dependable Producers

Save delays
More operating days
Lowest cost per yard pays

Built of rugged construction for hard service. Shell, side plates and runner—parts exposed to abrasive wear and constant grinding action—are made of manganese steel.

Extra heavy shaft, sturdy bearings, ball bearing thrust collar and well balanced runner, make the AMSCO pump a smooth-running and efficient machine.

AMSCO Flap Valves, Pipe and Elbows
Write for Pump Bulletin

American Manganese Steel Company

General Offices: 1872 McCormick Building, Chicago

Western Sales Office: Newhouse Bldg., Salt Lake City
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THE SCOOP CONVEYOR
OVER 2000 IN USE
SAVES TIME AND LABOR — ENABLES MEN TO WORK EFFICIENTLY IN UNLOADING OR LOADING CARS OR TRUCKS. REPLACES FROM 6 TO 12 MEN
Keeps Equipment Moving
Saves Car Demurrage
WRITE FOR LITERATURE
PORTABLE MACHINERY CO.
PASSAIC, N.J.
R.&P.
1880

NOW COMES THE

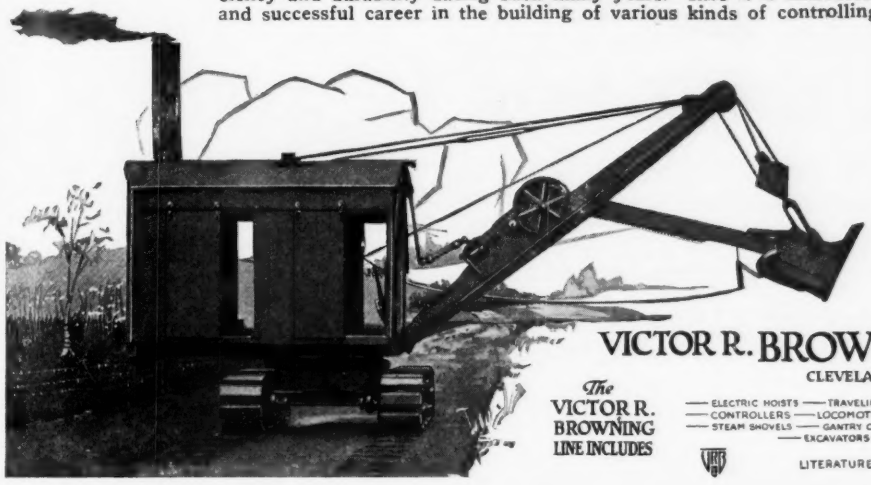
Tank Crawler VRB Steam Shovel

VRB Steam Shovels are now available, mounted on an improved tank crawler truck.

In the war, tanks proved their utility beyond a shadow of doubt.

Likewise, the VRB tank crawler has demonstrated its fitness to operate in places and under soil conditions that would put an ordinary steam shovel entirely out of commission.

As regards the power plant and control mechanism, this shovel holds a reputation for uncommon efficiency and durability dating back many years. Into it is embodied the knowledge gained from a long and successful career in the building of various kinds of controlling and material handling machinery.



VRB Shovels are manufactured for either steam or electric operation in 7½ and 10-ton sizes, and dipper capacities of ¾ to 1 yard.

Copies of the new steam shovel bulletin will be sent to all interested, and those having unusual excavating or material handling problems are invited to avail themselves of the advisory service of our engineering department.

Your attention is called to the complete VRB line as mentioned below, and the ease with which you can obtain bulletins on any subject of interest.

VICTOR R. BROWNING & COMPANY
CLEVELAND, OHIO

The VICTOR R. BROWNING LINE INCLUDES

ELECTRIC HOISTS — TRAVELING CRANES — MILL TYPE MOTORS
CONTROLLERS — LOCOMOTIVE CRANES — CLAM SHELL BUCKETS
STEAM SHOVELS — GANTRY CRANES — DERRICKS — DREDGES
EXCAVATORS — BUCKET TROLLEYS

LITERATURE WILL BE SENT

CHECK ITEMS OF INTEREST WRITE NAME ON MARGIN AND MAIL

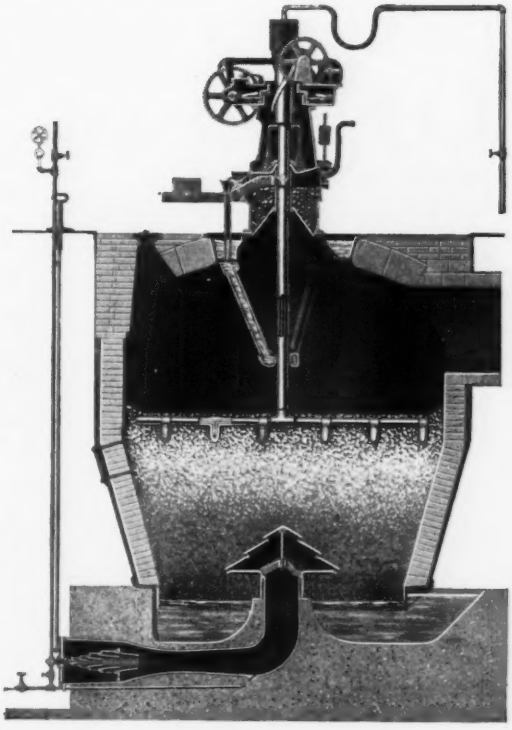
Increase Your Production

of high grade lime by heating your kilns with producer gas generated in

CHAPMAN Agitator Producers

They deliver a constant supply of high quality gas, thus insuring a uniform temperature in the kiln. This uniform supply of high quality gas burns with a long, clear flame which resembles the flame from a wood fire. The result is a greater production of first grade lime.

The Chapman Floating Agitator will increase the capacity and the efficiency of hand-poked producers already in operation.

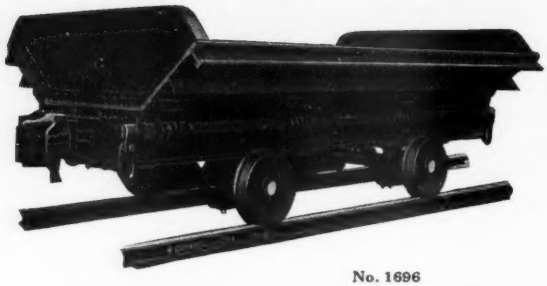


Write us for special information

The Chapman Engineering Company

Oliver Bldg. Pittsburgh — MT. VERNON, OHIO — 11 Broadway New York

KOPPEL



No. 1696

KOPPEL CARS FOR QUARRIES

In all types and sizes—strong, rugged construction throughout.

The type illustrated is an all steel car with resilient wood bumper—an all-around quarry car that will give long, continuous service.

Write for catalogue

KOPPEL INDUSTRIAL CAR & EQUIPMENT CO.
KOPPEL, PENNA.

SALES OFFICES
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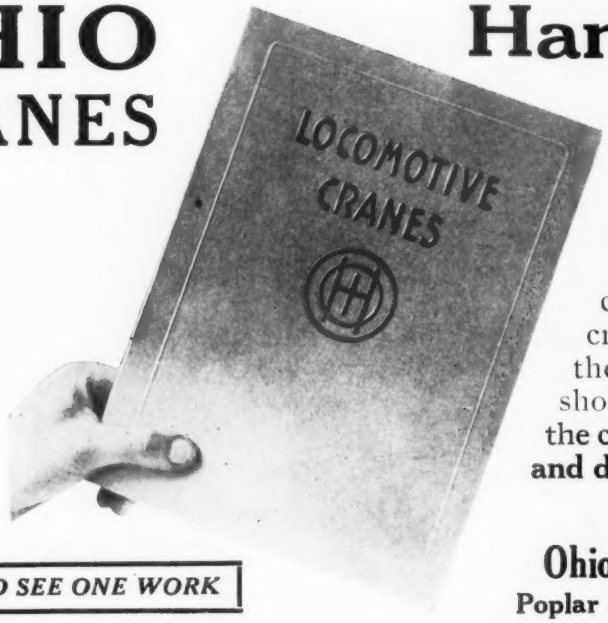
OHIO CRANES

The Answer to that Handling Problem



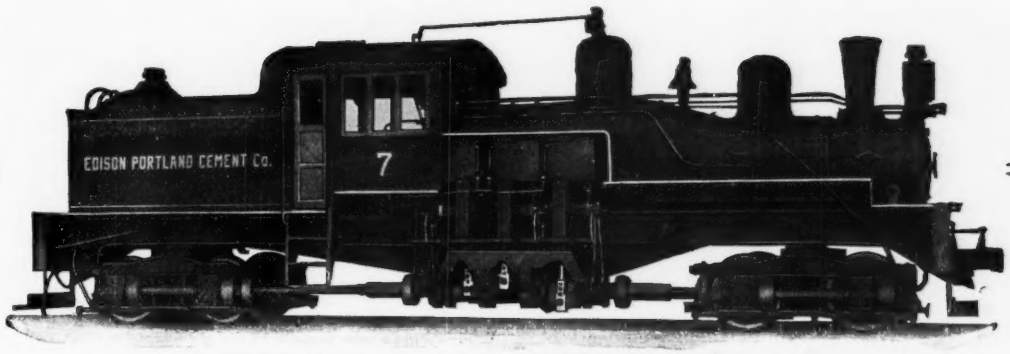
You will find it in the pages of this catalog.

To be satisfactory to a contractor a locomotive crane should do not simply the work specified, but should be able to do **whatever the contractor has to be done—and do it well.**

Send for your copy

GO AND SEE ONE WORK

Ohio Locomotive Crane Co.
Poplar Street, BUCYRUS, OHIO



60-TON SHAY ENGINE BUILT BY LIMA FOR EDISON PORTLAND CEMENT CO.

Keep Them Moving

"Shay" engines are especially adapted to uneven track.

Every wheel is a driver—there is no slipping at bad spots as with a rod engine.

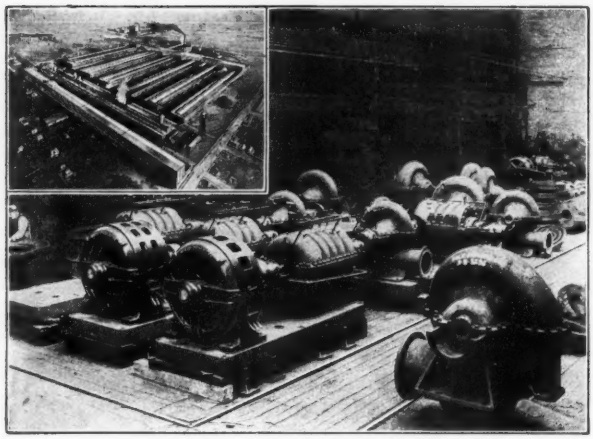
"Shays" keep your rock moving, so that there is uninterrupted output.

The kind of service they give is the kind that produces largest net profits.

LIMA LOCOMOTIVE WORKS, Inc.

LIMA, OHIO 30 Church St., New York

THE OWEN BUCKET CO., 448 Rockefeller Bldg., Cleveland, Ohio



Centrifugal Pump Assembling Shop

This building is about 700 feet long and is one of 14 buildings comprising the West Allis Works shown in insert.

Allis-Chalmers Machinery in Successful Operation Throughout the World

The basic cause for the increasing demand of ALLIS-CHALMERS machinery is found in the fact that, having been engaged in the design and manufacture of machinery for many years, this Company's products are NO EXPERIMENT. For this reason ALLIS-CHALMERS machinery is purchased for the most exacting requirements and for installation in the remotest parts of the world where dependable machinery must be installed.

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Milwaukee, Wisconsin, U. S. A.

District Offices in All Leading Cities

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Steam Turbines - Steam Engines
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Steam and Electric Hoists
Air Compressors - Air Brakes
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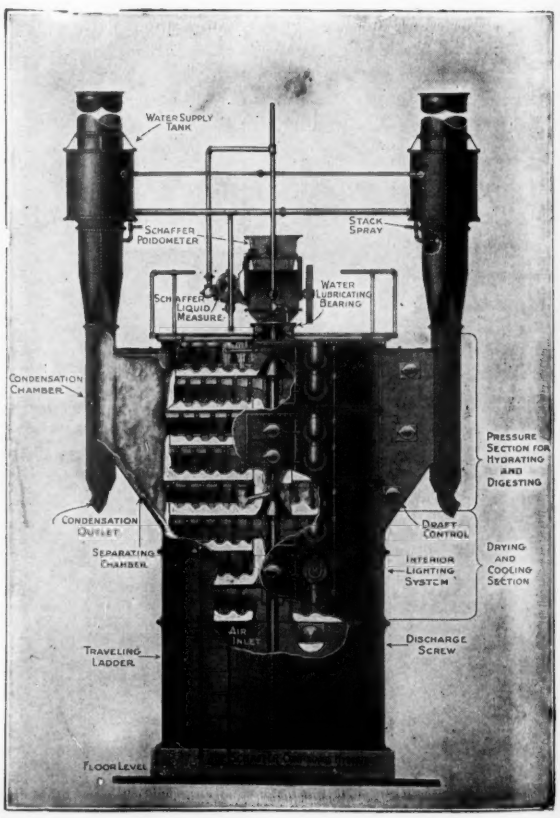
Condensers

SCHAFFER
Continuous Lime Hydrators

AUTOMATIC operation delivers lime by **weight,** not volume, to the Schaffer Hydrator. Automatically, water, too, is added in correct proportion—insuring a continuous flow of a superior product.

The flexibility of control enables the use of either high calcium or dolomite lime, while at the same time the automatic operation of Schaffer Hydrators solves the labor problem, as they require but little attention.

Our literature on the Schaffer Hydrator covers all the questions you now have in mind. Write for it at once!



Schaffer Engineering & Equipment Co.

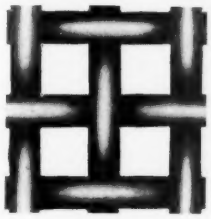
James Bldg., Chattanooga, Tenn.

Peoples Bank Bldg., PITTSBURGH, PA.

All Grades of Wire Cloth Made of All Kinds of Wire

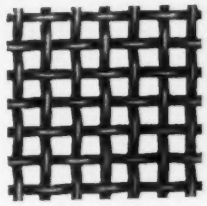
TRADE JERSEY MARK

The New Jersey Wire Cloth Company



MANUFACTURES WIRE CLOTH AND SCREENING REQUIRED IN THE PRODUCTION OF CEMENT, LIME, STONE, SAND, GLASS SAND, GRAVEL, PHOSPHATE, ETC.

WE CARRY IN STOCK A LARGE VARIETY OF REGULAR GRADES FROM WHICH ORDERS CAN BE FILLED PROMPTLY — AND CAN MAKE TO ORDER SPECIAL MATERIAL.



For forty years we have been engaged in manufacturing wire cloth, insuring a satisfactory product

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TRENTON, NEW JERSEY

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210 Fulton St.
Near Hudson Terminal

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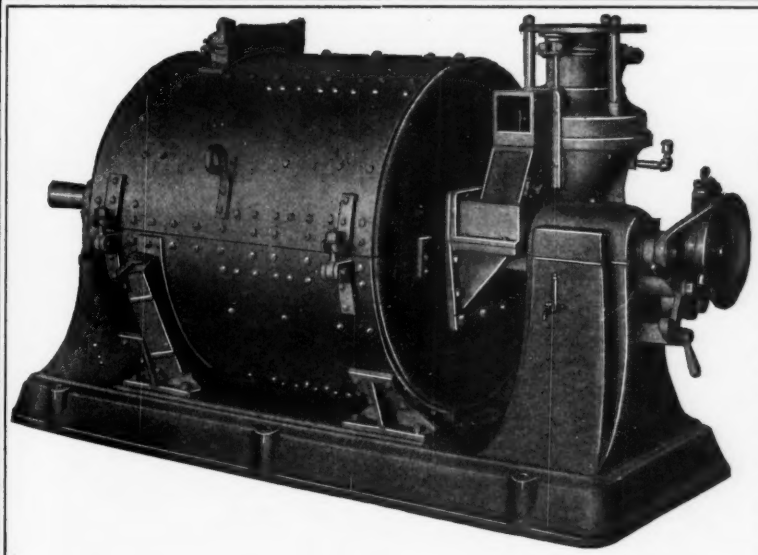
Roebling, New Jersey — WORKS — Philadelphia, Pennsylvania

ROEBLING WIRE USED IN ALL OUR PRODUCTS



AERO
PULVERIZERS

Complete equipment for supplying pulverized coal to metallurgical furnaces, cement and lime kilns, to dryers and to all furnaces requiring a regular temperature and a quality of flame under prompt, easy control.

The AERO makes practicable the highest efficiency obtainable from coal. It makes it burn like a gas, producing at will a wide range of temperatures, a flame, the physical and chemical character of which is regulable — one that may be elongated or shortened, made oxidizing, reducing or neutral, as occasion may require.

Each pulverizer is primarily intended to operate as a unit with a single furnace. The AERO is built in five standard sizes, ranging in capacity from 600 to 5,000 lbs. of coal per hour.

Backed by the Longest Successful Service of Any Pulverized Coal Equipment

The Aero Pulverizer Co., 120 Broadway, New York, N. Y.

Buyers' Guide of the Rock Products Industry

AIR COMPRESSORS
Worthington Pump & Mach. Co., New York City.

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CLIPS, WIRE ROPE
American Hoist & Derrick Co., St. Paul, Minn.

CONVEYORS AND ELEVATORS
Caldwell, H. W., & Son Co., Chicago, Ill.
Gifford-Wood Co., Hudson, N. Y.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Portable Machinery Co., Passaic, N. J.
Robins Conveying Belt Co., New York City.
Smith Eng. Works, Milwaukee, Wis.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Tiffin, Ohio.
Weller Mfg. Co., Chicago, Ill.

CRANES
Locomotive Gantry
American Hoist & Derrick Co., St. Paul, Minn.
Advance Eng. Co., Cleveland, O.
Ball Engine Co., Erie, Pa.
Browning Co., Cleveland, Ohio.
Byers Mach. Co., John F., Ravenna, Ohio
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
McMyler-Interstate Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Osgood Co., The, Marion, Ohio.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., St. Louis, Mo.
Austin Mfg. Co., Chicago, Ill.
Bacon, Earle C., Inc., New York City.
Beaumont Mfg. Co., Philadelphia, Pa.
Buchanan Co., Inc., C. G., New York City.
Bradley Pulverizer Co., Allentown, Pa.
Butterworth & Lowe, Grand Rapids, Mich.
Chalmers & Williams, Chicago Heights, Ill.
Fuller-Lehigh Co., Fullerton, Pa.
Good Roads Mach. Co., Kennett Square, Pa.
Jeffrey Mfg. Co., The, Columbus, Ohio.
K. B. Pulverizer Co., New York City.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co., Chicago, Ill.
Smidth & Co., F. L., New York City.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Webb City & Carterville F. & M. Works, Webb City, Mo.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.
Worthington Pump & Mach. Corp., New York City

DERRICKS
American Hoist & Derrick Co., St. Paul, Minn.

DRILLS
Sanderson Cyclone Drill Co., Orrville, Ohio.
Wood Drill Works, Paterson, N. J.

DRYERS
American Process Co., New York City.
Ruggles-Coles Eng. Co., N. Y. City.
Vulcan Iron Works, Wilkes-Barre, Pa.

DYNAMITE
Aetna Explosives Co., New York City.
Atlas Powder Co., Philadelphia, Pa.

ENGINES, OIL & GAS
Worthington Pump & Mach. Co., New York City.

ENGINES, STEAM
Morris Mach. Works, Baldwinsville, N. Y.

ENGINEERS
Arnold & Weigel, Woodville, Ohio.
Bacon, Earle C., Inc., New York City.
Bradley Pulv. Co., Allentown, Pa.
Buckbee Co., J. C., Chicago, Ill.
Fuller Engineering Co., Allentown, Pa.
Smidth & Co., F. L., New York City.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Yates, Preston K., New York City.

EXCAVATORS
Ball Engine Co., Erie, Pa.
Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ind.
Owen Bucket Co., Cleveland, Ohio.

EXCAVATORS
Dragline Cableway
Sauerman Bros., Chicago, Ill.

EXPLOSIVES
Aetna Explosives Co., New York City.
Atlas Powder Co., Philadelphia, Pa.

FIRE BRICK
Robinson Clay Product Co., The, Akron, Ohio.

FUSES
Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS
Chapman Eng. Co., Mt. Vernon, Ohio.
International Clay Mach. Co., Dayton, Ohio.

GEARS
Caldwell, H. W., & Sons Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.

GLASS SAND EQUIPMENT
Lewistown Fdy. & Mach. Co., Lewistown, Pa.

HOISTS
American Hoist & Derrick Co., St. Paul, Minn.
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Vulcan Iron Works, Wilkes-Barre, Pa.

HOSE
Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co., Cincinnati, O.
Goodyear Tire & Rubber Co., Akron, O.
N. Y. Belting & Packing Co., New York City.

HYDRATING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

HYDRAULIC DREDGES
Morris Machine Works, Baldwinsville, N. Y.

INDUSTRIAL CARS
Atlas Car & Mfg. Co., Cleveland, Ohio.
Easton Car & Constr. Co., Easton, Pa.
International Clay Machine Co., Dayton, Ohio.
Koppel Indust. Car & Equip. Co., Koppel, Pa.
Watt Mining Car Wheel Co., Barnesville, Ohio.

LIME KILNS
Arnold & Weigel, Woodville, Ohio.
Steacy-Schmidt Mfg. Co., York, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS
Ball Engine Co., Erie, Pa.
Gifford-Wood Co., Hudson, N. Y.
International Clay Mach. Co., Dayton, O.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.

LOCOMOTIVES
Baldwin Locomotive Works, The, Philadelphia, Pa.
Fate-Root-Heath Co., Plymouth, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York City.
Porter Co., H. K., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MANGANESE STEEL
American Mang. Steel Co., Chicago, Ill.

MOTORS, ELECTRIC
Gifford-Wood Co., Hudson, N. Y.

MOTOR TRUCKS
Duplex Truck Co., Lansing, Mich.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio
Pierce-Arrow Motor Car Co., Buffalo, N. Y.

PACKING
Sheet, Piston, Superheat, Hydraulic
Cincinnati Rubber Mfg. Co., Cincinnati, O.
Goodyear Tire & Rubber Co., Akron, O.
N. Y. Belting & Packing Co., New York City.

PAINT AND COATINGS
Williams, C. K., & Co., Easton, Pa.

PERFORATED METALS
Chicago Perforating Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Johnston & Chapman Co., Chicago, Ill.
Nortmann Duffke Co., Milwaukee, Wis.

PLASTER MACHINERY
Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J.B., Enterprise, Kan.

PORTABLE CONVEYORS
Stephens-Adamson Mfg. Co., Aurora, Ill.

PORTABLE STONE BINS
Austin Mfg. Co., Chicago, Ill.

PUMPS
American Well Works, Aurora, Ill.
Worthington Pump & Machine Co., N. Y. City.

PUMPS, SAND
American Manganese Steel Co., Chicago, Ill.
K. C. Hay Press & Tractor Co., Kansas City, Mo.
Morris Mach. Works, Baldwinsville, N. Y.

POWER TRANSMITTING MACHINERY
Caldwell, H. W., & Son. Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Weller Mfg. Co., Chicago, Ill.

POWDER
Aetna Explosives Co., New York City.
Atlas Powder Co., Philadelphia, Pa.

PULVERIZED FUEL EQUIPMENT
Aero Pulv. Co., New York City.
Bradley Pulv. Co., Allentown, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

QUARRY EQUIPMENT
Beaumont Mfg. Co., Philadelphia, Pa.
Marion Steam Shovel Co., Marion, O.
Universal Road Mach. Co., Kingston, N. Y.

SCRAPERS, DRAG
Sauerman Bros., Chicago, Ill.

SCREENS
Audubon Wire Cloth Co., Audubon, N. J.
Austin Mfg. Co., Chicago, Ill.
Beaumont Mfg. Co., Philadelphia, Pa.
Cross Eng. Co., Carbondale, Pa.
Gifford-Wood Co., Hudson, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Johnston & Chapman Co., Chicago, Ill.
National Engineering Co., Chicago, Ill.
New Jersey Wire Cloth Co., Trenton, N. J.
Smith Eng. Works, Milwaukee, Wis.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Stimpson Equip. Co., Salt Lake City, Utah.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.

SEPARATORS
National Engineering Co., Chicago, Ill.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.

SEPARATORS, MAGNETIC
Buchanan Co., C. G., Inc., New York City.

SHEAVES
Mayer-Hasseldiek Mfg. Co., St. Louis, Mo.

SHOVELS
Steam and Electric
Ball Engine Co., Erie, Pa.
Bucyrus Company, Milwaukee, Wis.
Marion Steam Shovel Co., Marion, Ohio.
The Osgood Co., Marion, Ohio.
Victor R. Browning & Co., Cleveland, Ohio.

STONE ELEVATORS
Austin Mfg. Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Weller Mfg. Co., Chicago, Ill.

TANK CRAWLERS
Victor R. Browning & Co., Cleveland, Ohio.

TRACK EQUIPMENT
Central Switch & Frog Co., Cincinnati, Ohio.
Track Equipment Co., Huntington, W. Va.

VALVES
Goodyear Tire & Rubber Co., Akron, O.

WASHERS, GRAVEL
Smith Eng. Works, Milwaukee, Wis.

WIRE ROPE
American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.
Roebling's Sons Co., John A., Trenton, N. J.
Waterbury Co., New York City.

WIRE CLOTH
Audubon Wire Cloth Co., Audubon, N. J.
Cleveland Wire Cloth Co., Cleveland, Ohio.
New Jersey Wire Cloth Co., Trenton, N. J.

SAUERMAN
DRAGLINE CABLEWAY EXCAVATORS

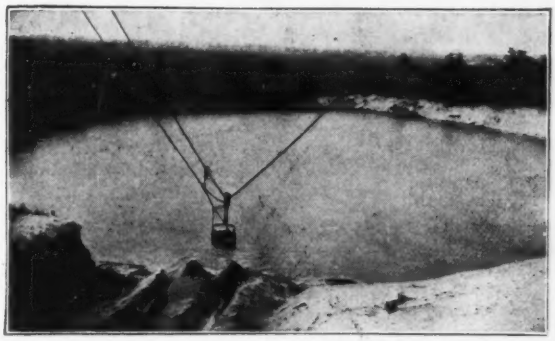
Among the producers assembled for the annual convention of the National Association of Sand and Gravel Producers at Chicago on February 11, 12 and 13, one sentiment was unanimous. This was that if the railroads furnish all the cars needed, the sand and gravel industry will have its banner year and contractors and road officials need not worry about any lack of aggregates forcing them to open their own pits.

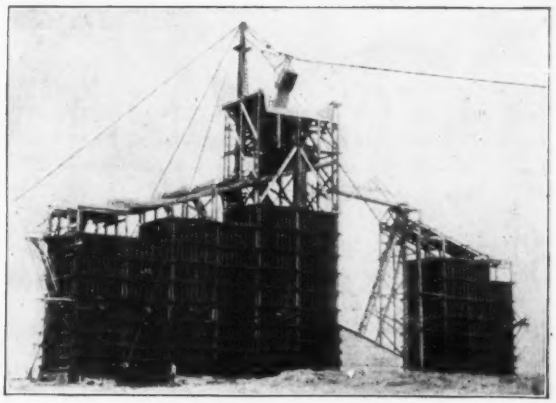
This optimism will be justified if all the producers exercise the same forethought as these leaders of the industry.

For we have noticed that these leaders—many of whom are using Sauerman Dragline Cableway Excavators—are bringing their plants to a high state of efficiency and arranging to increase their capacity if necessary to meet the demands in their selling territories.

Now is the time for all producers to prepare. If the demand for sand and gravel in your territory appears to warrant you in enlarging the capacity of your present plant or in opening a new pit, take your proposition up with us at your earliest opportunity.

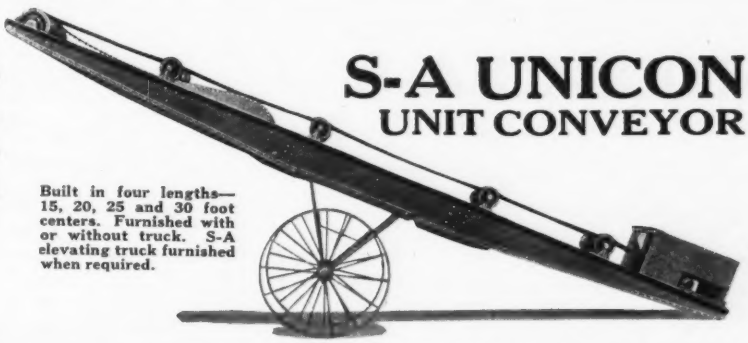
Sauerman Bros., 1140 Monadnock Bldg., Chicago





-dig, convey, elevate & dump in one continuous movement under complete control of one man.

Here is a real time and money saver. Replace the wheelbarrow with an S-A Unicon.



Built in four lengths—15, 20, 25 and 30 foot centers. Furnished with or without truck. S-A elevating truck furnished when required.

S-A UNICON
UNIT CONVEYOR

S-A UNICON PORTABLE CONVEYOR

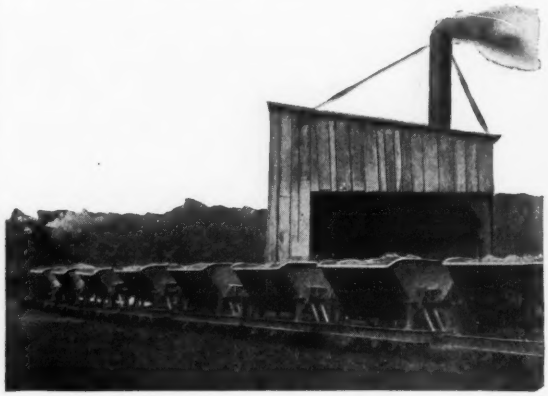
To handle materials for a short distance, quickly and economically, is the function of the S-A Unicon. This conveyor has been designed to be easily portable and thoroughly reliable and dependable in service. The machine is self-contained, the motor and driving mechanism are enclosed and completely protected. Any material which can be conveyed on an 18-inch belt can be handled by the Unicon. All the parts are standard and interchangeable.

SPECIFICATIONS

Belt width	18 inches	Frame	Streamline plate girder type
Centers	15, 20, 25 and 30 foot centers	Decking	Plate decking entire length
Width of frame	2 feet 3½ inches	Loading hopper	Removable steel plate hopper
Depth of frame	12 inches	Main bearings	Roller bearing equipped
Belt	High-grade conveyor belt	Carriers	Roller bearing equipped

SEND FOR CIRCULAR "U"

STEPHENS-ADAMSON MFG. CO., AURORA, ILL.



Easton Cars "on the job"

QUARRY service imposes upon cars and car equipment particularly severe conditions which cannot be ignored if the equipment is to rise above these conditions.

Not only do we understand the nature of these conditions, but in most cases we have actually built cars and equipment that have demonstrated through long, active, actual service that we know what to do to overcome the conditions and how to do it.

That is why our standard line of cars, tracks, ties, switches, crossovers, turnouts, turn-tables, etc., really give special service at a quantity production price.

Should you, however, require specially built cars you will find our quarter century of industrial railway experience advantageous and our facilities adequate to meet your most exacting demands.

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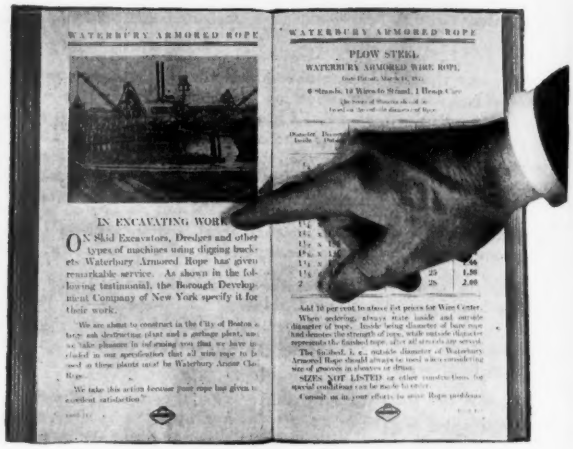
WATERBURY



Safe Longer

The initial factor of safety is maintained longer in Waterbury Armored Wire Rope (Gore Patent) than in any other form of construction. The strands take the strain as in bare wire rope—but that is all they have to stand. They are protected from abrasion and exposure by the flat-wire armor—which also helps to retain the internal lubrication. Thus the strength of the original rope is preserved, unimpaired, until the flat wires have worn through. Even then, after Armored rope has outlasted two ordinary ropes, the worn flat wires have merely packed into the interstices and increased the wearing surface, and the Armored rope is still serviceable.*

No flexibility is lost through this efficient protection, for the convex edges of the armor wire (the patented feature) permit as free movement as in the same size of bare wire rope, and prevent any interlocking in bending. This has the additional advantage of eliminating internal friction between the strands themselves, and also of allowing the use of a wire rope core because of the prevention of chafing between inner and outer rope by the armor-wire.

WATERBURY COMPANY
63 PARK ROW, NEW YORK

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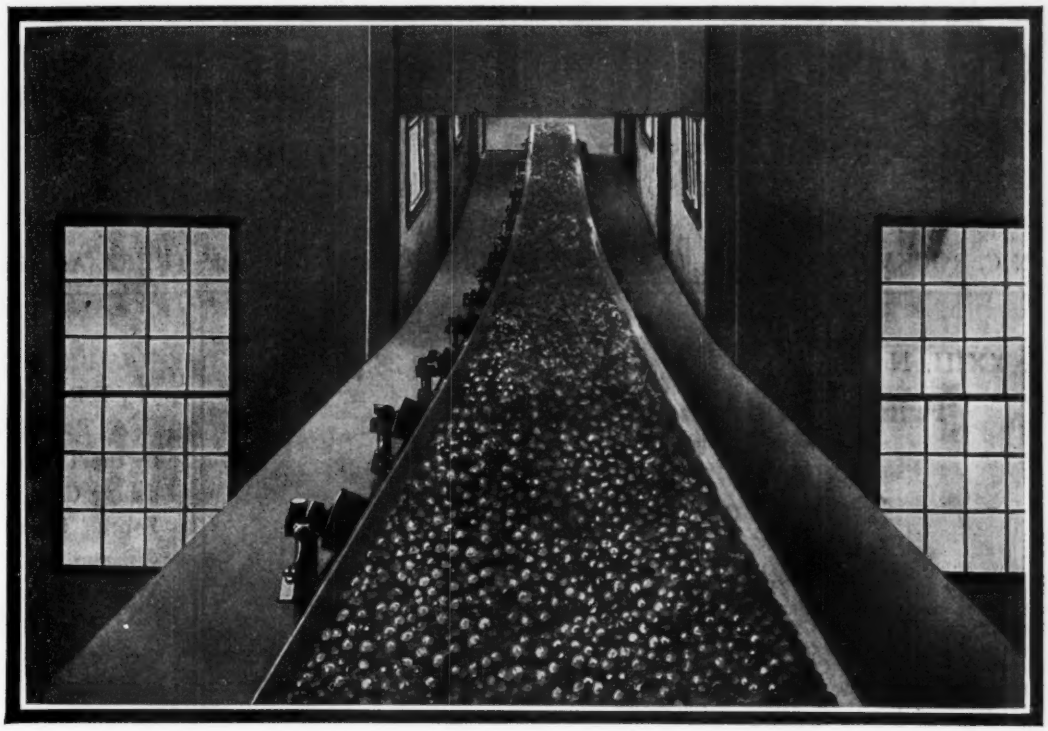
DALLAS, TEX. . . . . A. T. Powell & Co.

*The Waterbury Rope Hand Book explains fully the advantages of this patented construction—and tells all about every other sort of rope. Ask for a copy. It's free.

2350-W



NEW YORK BELTING & PACKING CO. FOUNDED 1846 INCORPORATED 1856

Our Products Include:

Teat Special Rubber Belting
Indestructible White Sheet Packing
Firo Superheat Sheet Packing
Cobbs High Pressure Piston Packing
Indestructible Steam Hose
Indestructible Pneumatic Tool Hose
Double Diamond Pump Valves
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Your ton cost of conveying loose bulk materials is in direct ratio to the life of the belting used.

Therefore it pays to convey with Indestructible Conveyor Belting—it pays because Indestructible stands the stress of the toughest conveying job.

The extra strength built into the belt takes care of unusual strains with an ample margin of safety. The rubber cover affords secure protection against injury or wearing of the duck. Separation in the plies is guarded against by a tenacious friction strength.

Indestructible Conveyor Belting Will Keep Your Conveying Systems on a Profitable Basis

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